UNIT 4

Exploring Soils

BIG IDEAS

In this unit, you will learn that:

- scientists and First Nations and Métis peoples understand soil in similar and different ways
- soils are different
- plants, animals, and soil depend on each other
- people use soil in different ways
- people can affect soil

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A prairie dog popped up and ducked out of sight as Mia and Jay dug in the garden.

Mia picked up a handful of soil. "Jay, what do you think soil is made of?"

"It's just dirt," said Jay.

"But I can see different bits in the soil," said Mia. "If soil is just dirt, wouldn't it all look the same?"

"Check out that worm in it!" said Jay.

"That worm lives on more than dirt! There's more to soil than you think!"

Do you agree with Jay that soil is just dirt? Or, do you agree with Mia that there is more to soil than dirt? In this unit, you will find out what soil is made of.

Looking Forward

1. What do you know about soil? Record what you know in a KWL chart.
2. What do you want to know about soil? Use the chart to record questions you want to have answered in the unit.

Design Project

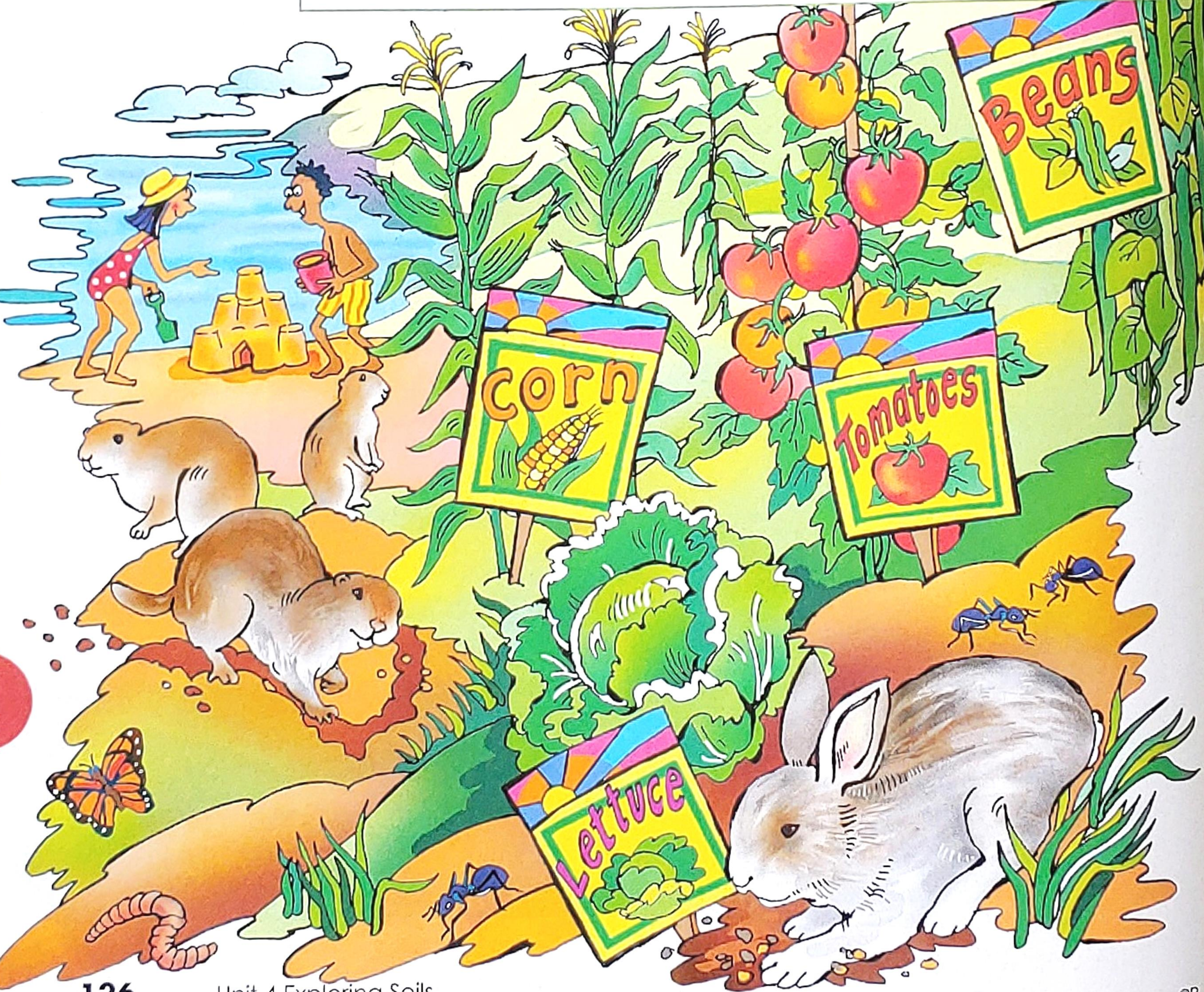
At the end of this unit, you will complete a design project. You will create soil for a school vegetable garden. The *Build On What You Know* activities found in the unit will help you with your project.

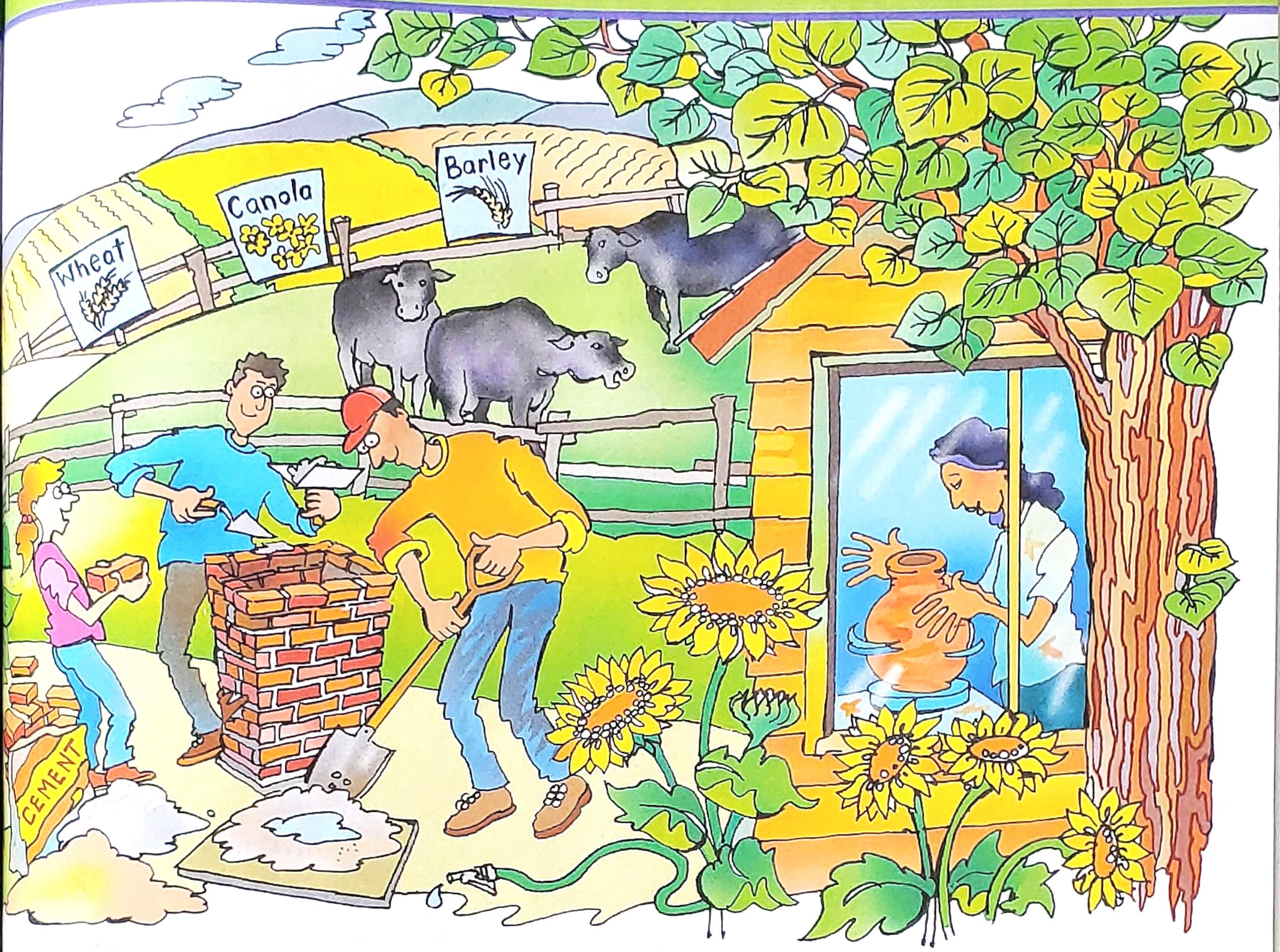
How Do We Depend on Soil?

Get Started

Do you ever think about soil and what it means to you? Many First Nations and Métis peoples believe that Mother Earth is a part of us and that we are a part of Mother Earth. When they pick plants and medicines, they honour Mother Earth by placing tobacco on or in the soil [*asiskiy* in Cree]. Humans cannot live without soil. Most living things depend on soil in some way. Think about what these ways are as you look at this picture.

Maybe you think all soil is the same. But soils are different depending on where you look. Look for clues about what makes soils different in the picture.





Work On It

With a partner, look at the picture and discuss these questions. Make a list of your ideas for each question.

1. How do living things depend on soil?
2. How is soil important to people?
3. Where might the soil be different?
4. What might make the soil different in these places?

Communicate

1. Share your lists of ideas with others in your class.
2. As you share ideas with others, add new ideas to your lists.
3. Record three questions you have about soil that you would like to have answered by the end of the unit.

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Lesson

1

A Cup of Soil

Goal To discover what you can find in a cup of soil

Get Started

You have used soil in many different ways. Perhaps you have made a sandcastle or a mud pie. Maybe you have helped plant a garden. But have you ever looked closely at soil?

- What do you think you can find in a cup of soil?

Work On It

What does soil look like? What is in soil? What size are the different pieces in soil? Take a close look at a cup of soil and find out.

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What You Need

- newspaper
- cupful of soil
- sieve
- spoon
- magnifying lens
- camera (optional)

What You Will Do

1. Cover your workspace with newspaper.
2. Collect a soil sample from your teacher or from a place in your neighbourhood.
3. Place the soil in the sieve.
4. Shake the sieve to separate the big and small bits in the soil, as in the photo.
5. Use the spoon to move the big pieces into groups. Look closely at them with the magnifying lens.
6. Spread out the small bits. Look closely at them with the magnifying lens.
7. Take a photo or draw a picture of the groups you made.

SAFETY CAUTION!

If you collect a soil sample from your neighbourhood, your teacher will tell you which places are safe so that you do not harm plants or animals. Always wash your hands after handling soil.

Communicate

1. Where did the soil sample come from?
2. Explain to a partner what you found in the soil.
3. What did you find the most of in your soil sample?
4. Think of a different place where you could get a soil sample. How might the soil be different?

Lesson 2

How Do Scientists Understand Soil?

Goal To find out how scientists think about soil

Get Started

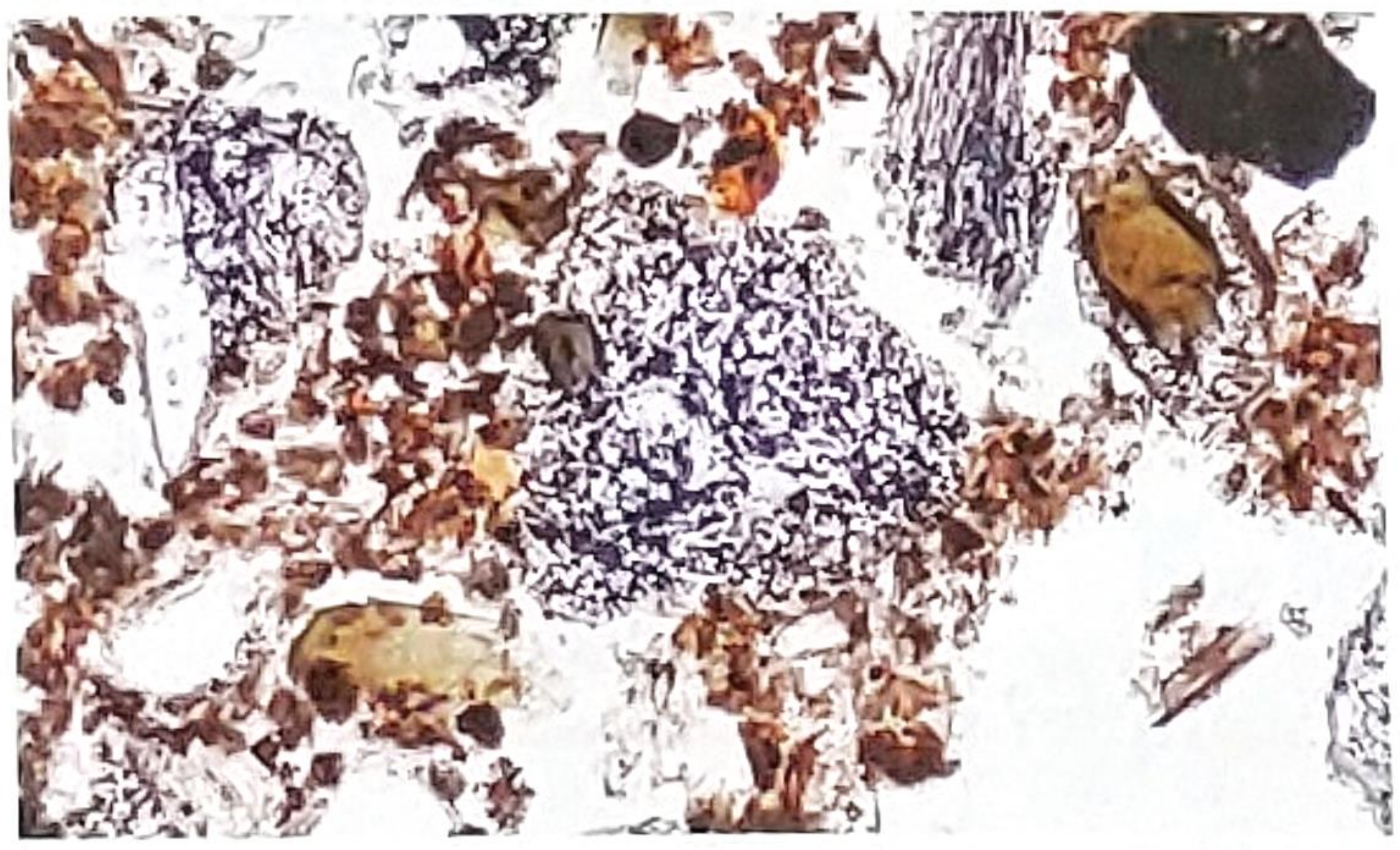
What do you think soil is made of? Moving water, wind, and changes in temperature can crack large rocks. Over a very long time, large rocks are broken into tiny pieces. These tiny pieces break into smaller bits, or **particles**. These particles become part of soil.

Many First Nations peoples call rock "Grandfather Rock" [*kise-nàpe-asiniy* in Cree]. First Nations people say that rocks are the oldest beings on Mother Earth. They have been on Mother Earth since the beginning of time.

Plant roots can also crack large rocks.

These small bits of rocks were once large rocks. In time, they will become part of soil.

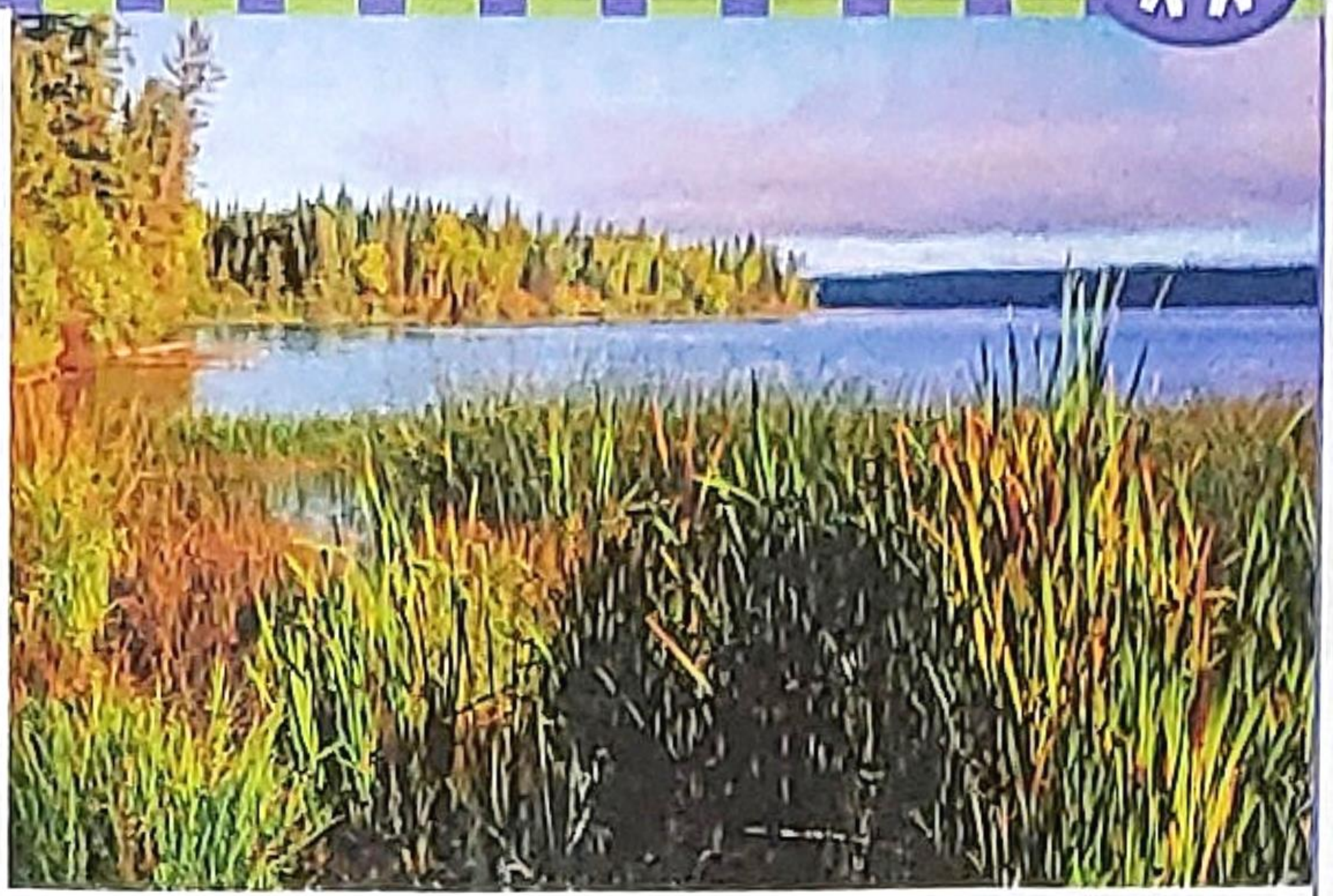
Soil has spaces in it. These spaces are filled with water and air. Dead animals and plants decay and break down into tiny pieces, or particles. These rotted plants and animals in soil are called **humus**. Humus is very dark brown. It crumbles when you touch it. Humus mixes with tiny particles of rocks, air, and water to form soil.

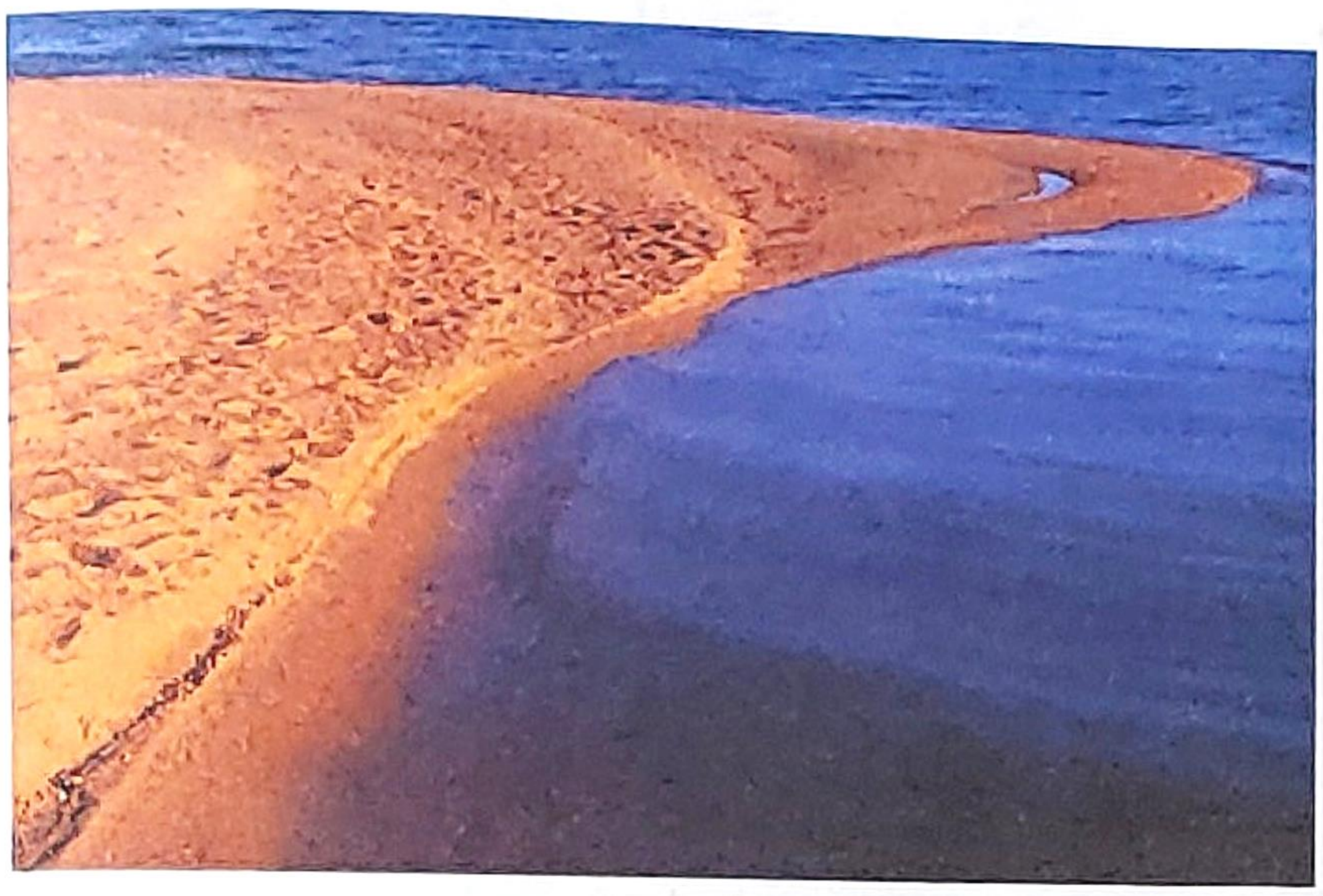

▲ If you look at soil through a microscope, you can see particles and spaces for water and air.

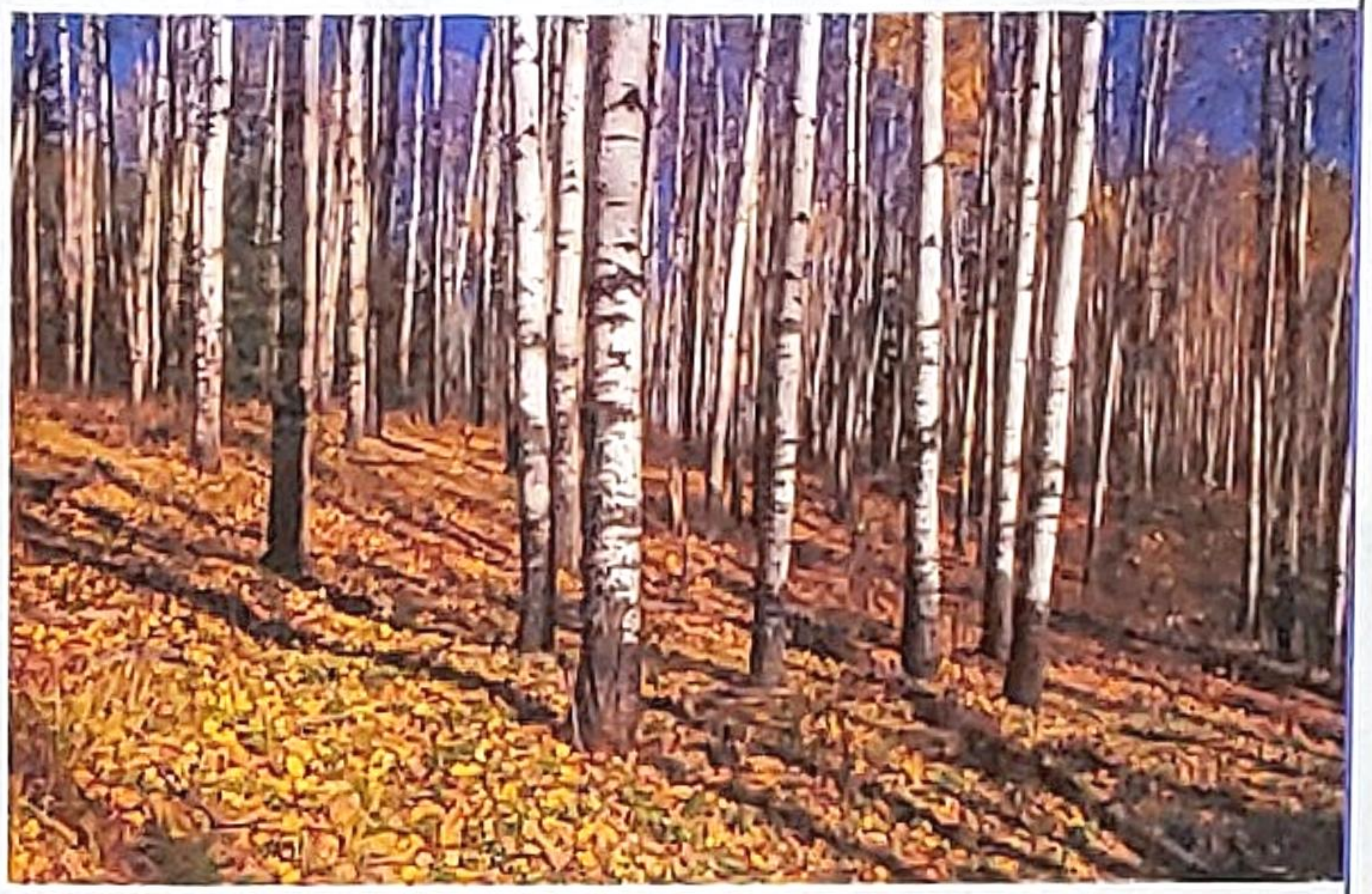
▲ In time, these dead leaves and this skeleton will break down to become part of soil.

Work On It

Scientists talk about soil being made up of four non-living parts—rocks, air, water, and humus. With a partner, look at each photo below as a scientist would. What do you see that would help make the soil? Would the soil in each photo have more rocks, air, water, or humus? Record your ideas.


What in these wetlands would help make the soil?


What at this beach would help make the soil?


What in this forest would help make the soil?

Communicate

1. With classmates, share and compare ideas about what would help make the soil in each photo.
2. What would make soil in a garden?
3. What would make soil in a field?

Build On What You Know

Look at your schoolyard as a scientist would. What would help make the soil that you will create for a school vegetable garden at the end of the unit? Will your soil have more rocks, air, water, or humus? Record your ideas.

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Lesson

3

How Do Indigenous Peoples Understand Soil?

Goal To find out how First Nations and Métis peoples think about soil

Get Started ▶

Mia watched her grandmother pick a plant out of the soil, put some tobacco in its place, and cover the tobacco with soil. "Grandma, what are you doing?"

Mia's grandmother smiled. "When I take from Mother Earth, I give back. With this tobacco, I am offering my thanks to Mother Earth."

"What do you mean?" asked Mia.

"All things from Mother Earth are gifts from Creator. That means that they are sacred. We must respect and honour them."

"I get it!" said Mia. "The plant you picked is a gift from Creator. The tobacco is your way of saying thank you to Mother Earth for this gift."

"That is correct, Mia," said her grandmother. "The soil and everything that depends on the soil are sacred. We must honour them by giving something back to Mother Earth."

Many First Nations and Métis people honour and respect Mother Earth in the same way as Mia's grandmother. They understand that Mother Earth is made of four parts—rock, air, water, and fire.

◀ Plants from Mother Earth are gifts from Creator.

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Soil is a part of Mother Earth. The spirit of Creator is alive in Mother Earth. Spirit connects everything and everyone together as one. It makes everything alive.

Work On It

Go for a walk outdoors in nature and observe the world around you. What gifts of Mother Earth can you see? Write notes, sketch, or take photos to record your observations.

A rotting log returns to Mother Earth to help fungus and new seedlings grow.

Communicate

1. Tell, write about, or show the gifts of Mother Earth that you observed.
2. How can you show respect for the soil and all living things?

Build On What You Know

When you make your soil for a school vegetable garden, how will you show respect for the gifts of Mother Earth that you use? Write down your ideas.

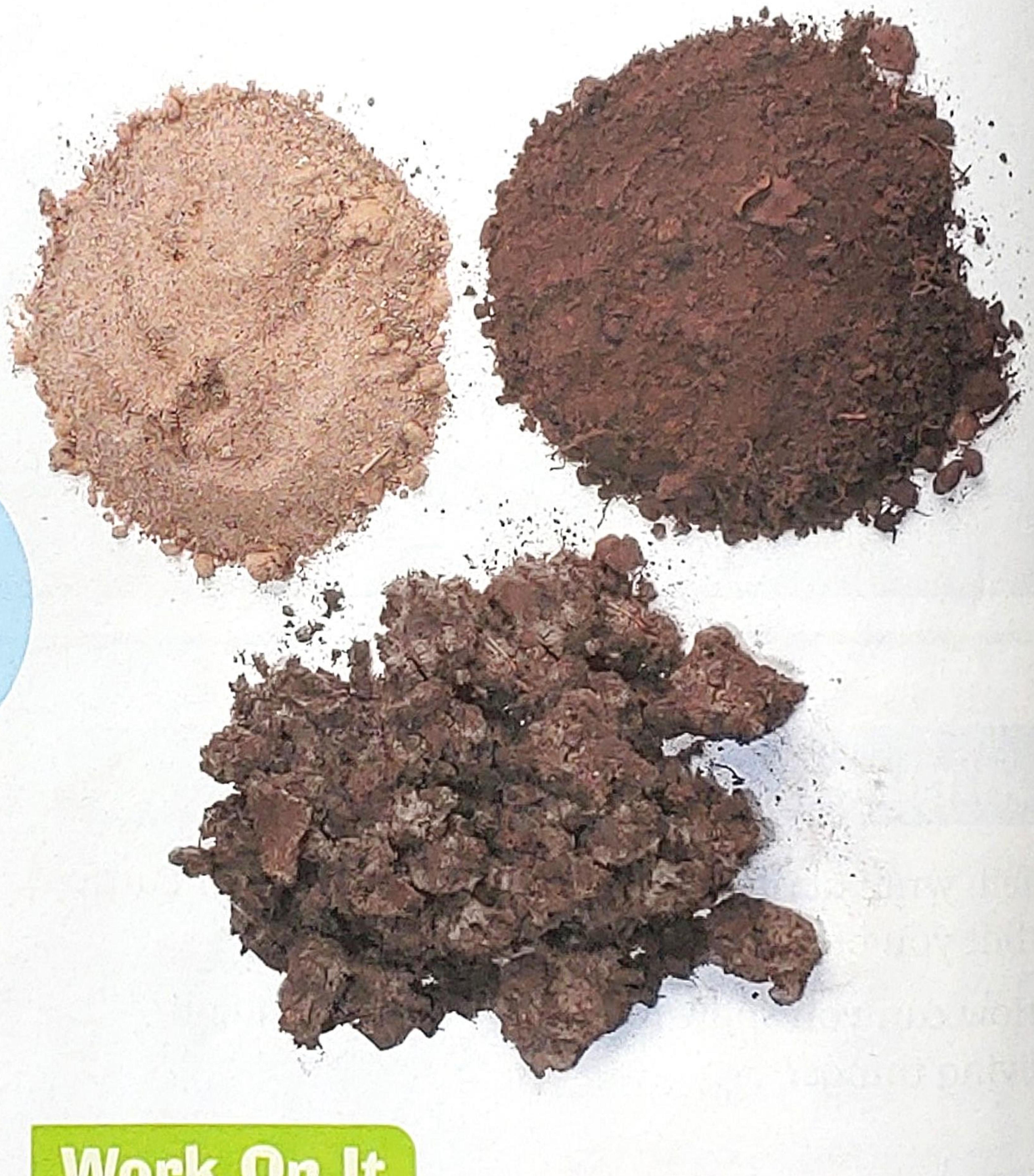
Lesson

4 What Makes Soils Different?

Goal To find out what makes one soil sample different from another

Get Started

There are many different kinds of rocks, plants, and animals on Earth. There are also many different kinds of soil. Some soil has tiny particles. Other soil has larger particles. Soil can be different colours and textures, such as soft or rough. Some soil is very dry. Some soil crumbles when you squeeze it in your hand. Other soil is sticky and holds together.



How do these three soil samples look the same? How do they look different?

Work On It

What makes one soil sample different from another? Take a close look at soil samples from different places. Find out how they are the same and how they are different.

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What You Need

- newspaper
- marker
- spoons
- 3 different soil samples
- magnifying lens

What You Will Do

1. Cover your workspace with newspaper. Draw three large circles on the newspaper. Number the circles: 1, 2, 3.
2. Use the spoons to put a different soil sample in each circle.
3. Observe each sample. Use a magnifying lens.

4. Use touch and sight to describe the samples. Squeeze the soil to see if it sticks together. Record your findings in a table like the one below.
5. Choose one characteristic from the table. Use it to sort your soil samples.

SAFETY CAUTION!

Never put soil in your mouth. Always wash your hands after handling soil.

Colour	Texture (How It Feels)	Particle Size	Sticks Together?

Communicate

1. Explain how you sorted the soil into groups.
2. How are the soil samples the same? Different?
3. Which soil sample do you think is good for growing things? Why do you think that?
4. Look back at your KWL chart. Which questions can you answer about soil?

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Lesson

5 What Is in Soil?

Goal To find out if a loam is mostly sand, silt, or clay

Get Started

In the last lesson, you looked at different characteristics to compare three soil samples. These characteristics help tell you what is in soil.

Scientists call the three main kinds of rock particles in soil sand, silt, and clay. **Sand** particles are the largest. They feel gritty. **Silt** particles are not as big as sand. They feel like powder. **Clay** particles are the smallest. They feel smooth and are sticky when wet.

Different types of soil can have different amounts of sand, silt, clay, and humus. Some soil has lots of sand in it. Some soil is high in silt. Other soil is high in clay. Some soil has lots of humus in it. When there are about the same amounts of sand, silt, and clay, scientists call these soils **loams**. Loams usually also have humus.

The soil at the Great Sand Hills in Saskatchewan has lots of sand in it. Soil in other places has different amounts of sand, silt, clay, and humus.

Work On It

Soils are a mixture of sand, silt, and clay. You can tell if a soil sample is high in sand, silt, or clay. All you need is your fingers!

What You Will Do

① Place each soil sample on a paper towel. Label each sample with the name of the place where you got it, as in the photo.

② Each sample should be damp, not soaking wet. If a sample is dry, spray it with water.

③ Rub soil from each sample between your fingers. Record the texture in a table like the one below.

④ Test each soil sample by trying to roll it into a worm shape. If it falls apart right away, it is high in sand. If it sticks together, let it dry. If it falls apart, it has lots of silt. If it stays together, it is high in clay.

Where Did I Get the Soil Sample?	Gritty, Slippery, or Sticky?	High in Sand, Silt, or Clay?

What You Need

- soil samples from 3 different places
- paper towels
- marker
- spray bottle of water

Communicate

1. Think about the place where you got each soil sample. Then look at how much sand, silt, and clay is in the soil. What might be the connection?
2. Think about the plants that grow where you got each soil sample. What might be the connection between the soil and the kinds of plants that grow in the soil? Discuss your ideas.

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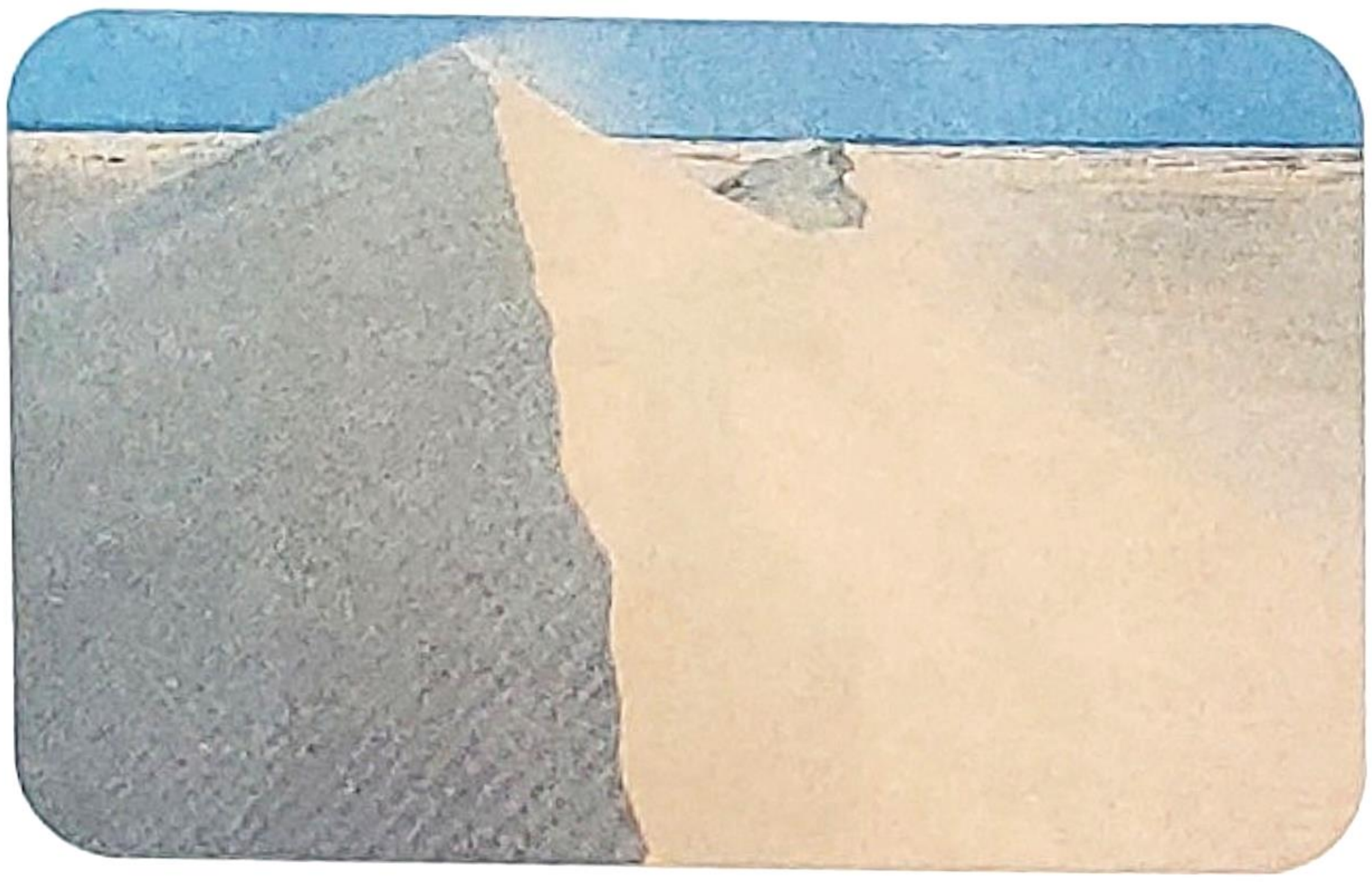
Lesson

6 Separating Soil

Goal To investigate how to separate the sand, silt, and clay in a soil sample

Get Started

You know that loam is a fairly even mixture of sand, silt, and clay with humus. You also know that different types of soil can have different amounts of sand, silt, and clay.



▲ Sandy soil is loose and does not hold water well. Most plants do not grow well in this soil.

▲ Soil that has a lot of silt holds water well. But the wind can blow this kind of soil away.

▲ Soil that has a lot of clay holds water very well. The grains are very small and tightly packed. Plants do not grow well in it.

▲ Loam holds water, and the humus in the loam has the nutrients plants need. It is useful to gardeners and farmers.

Work On It

In this investigation, you will separate a soil sample. You will decide which part is sand, which is silt, and which is clay.

What You Need

- glass jar with a lid
- soil sample
- water
- marker
- spoon
- paper towels
- magnifying lens

What You Will Do

1. Fill your jar about one-third full with soil. Add water until the jar is almost full. Draw a picture of what the jar looks like.
2. Put the lid on the jar tightly. Shake the jar for 2 minutes.
3. Wait 5 minutes. Mark the level of the first layer on the jar. Draw what you see in the jar.
4. Wait 3 to 4 hours. Mark the level of the next layer on the jar. Draw what you see in the jar.
5. The next day, mark the level of the third layer on the jar. Draw what you see in the jar.
6. Open the jar. Skim off any humus that is floating on top of the water.

Layer	Particle Size (Smallest, Largest)	Texture (How the Particles Feel)	Sand, Silt, or Clay?
Bottom			
Middle			
Top			

7. Drain the water off slowly. Scoop out the particles in each layer. Put them on a paper towel and label them. Try not to mix the layers.
8. Use a magnifying lens to look at the soil particles from each layer. Rub particles from each layer between your fingers. Record your findings in a table like the one above.

Communicate

1. How did the particle sizes look and feel different from layer to layer?
2. Label the drawing of your jar to show which part is clay, which part is silt, and which part is sand.

Lesson

7

How Much Water?

Goal To find out if sand, silt, clay, or loam holds the most water

Get Started

All plants need water to grow. Some plants can grow with just a little water from the soil. Other plants need a lot of water. Plants also need air from the soil. Most plants will drown if there is too much water in the soil. The water fills the spaces where air should be.

▲ Needle-and-thread grass grows well in soil that has very little water.

▲ Cattails grow best in water. Can you think of other plants like that?

Work On It

When water is added to soil, the soil holds some of the water. The rest of the water passes through the soil. In this investigation, you will find out if sand, silt, clay, or loam holds the most water.

What You Need

- equal amounts of dry sand, silt, clay, and loam
- nail or skewer
- 7 paper cups
- 7 pieces of fabric
- 2 measuring cups
- water
- soil samples from Lesson 5

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What You Will Do

1. Which soil sample do you think will hold the most water? Record your prediction.
2. Use the nail to poke 12 holes in the bottom of each cup. Put a piece of fabric in each cup to cover the holes.
3. Put 125 mL of dry sand in one cup.
4. Hold the cup over a measuring cup.
5. Pour 75 mL of water on the sand.
6. Let the water drip through the sand for 2 minutes.
7. Record the amount of water collected in the measuring cup.
8. Repeat steps 3 to 7 with the silt, clay, and loam samples.
9. Which soil sample from Lesson 5 will hold the most water? Record your prediction. Repeat steps 3 to 7 with these soil samples.

SAFETY CAUTION!

Take care when you handle the nail or skewer. It has a very sharp end, and it should only be used to poke holes in the paper cup.

Communicate

1. Which soil sample let the most water drip through and which held the most water?
2. Sort the samples by how much water they held.
3. Which sample do you think is best for growing plants? Explain how you figured out your answer.

You might want to use a bar graph to show your results.

Build On What You Know

What type of soil do you want for your school vegetable garden? Explain why you chose this type.

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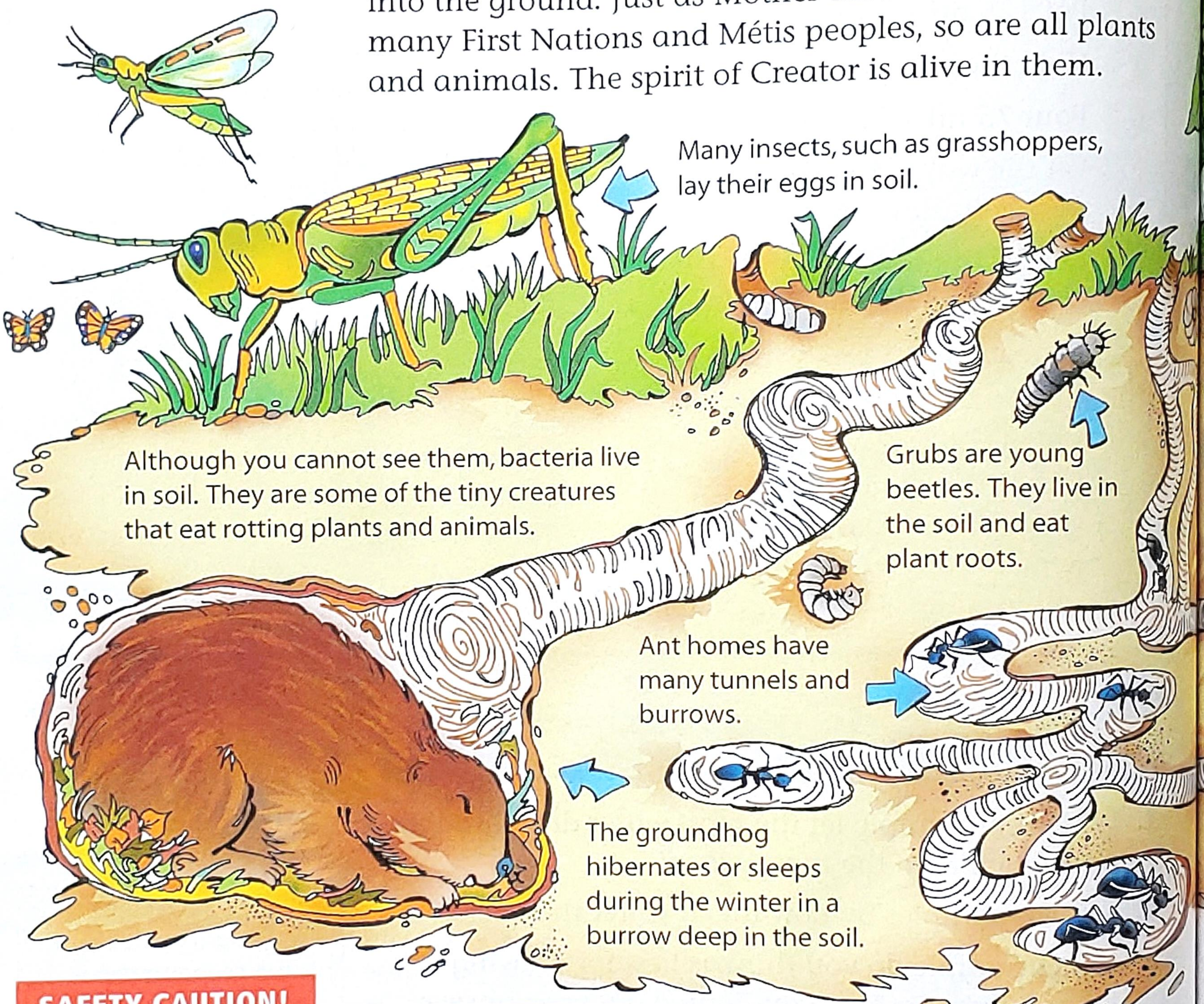
Lesson

8 What Lives in Soil?

Goal To find out how plants, animals, and soil depend on each other

Get Started

Soil is home to many plants and animals. Some live on top of the soil. Some live in the soil. Others dig deep into the ground. Just as Mother Earth is sacred to many First Nations and Métis peoples, so are all plants and animals. The spirit of Creator is alive in them.



Many insects, such as grasshoppers, lay their eggs in soil.

Although you cannot see them, bacteria live in soil. They are some of the tiny creatures that eat rotting plants and animals.

Grubs are young beetles. They live in the soil and eat plant roots.

Ant homes have many tunnels and burrows.

The groundhog hibernates or sleeps during the winter in a burrow deep in the soil.

SAFETY CAUTION!

If you look for living things in the soil outdoors, always put back logs and rocks quickly where you found them.

Work On It

Look at the picture to find ways that plants, animals, and soil depend on each other. Record your findings in a table.

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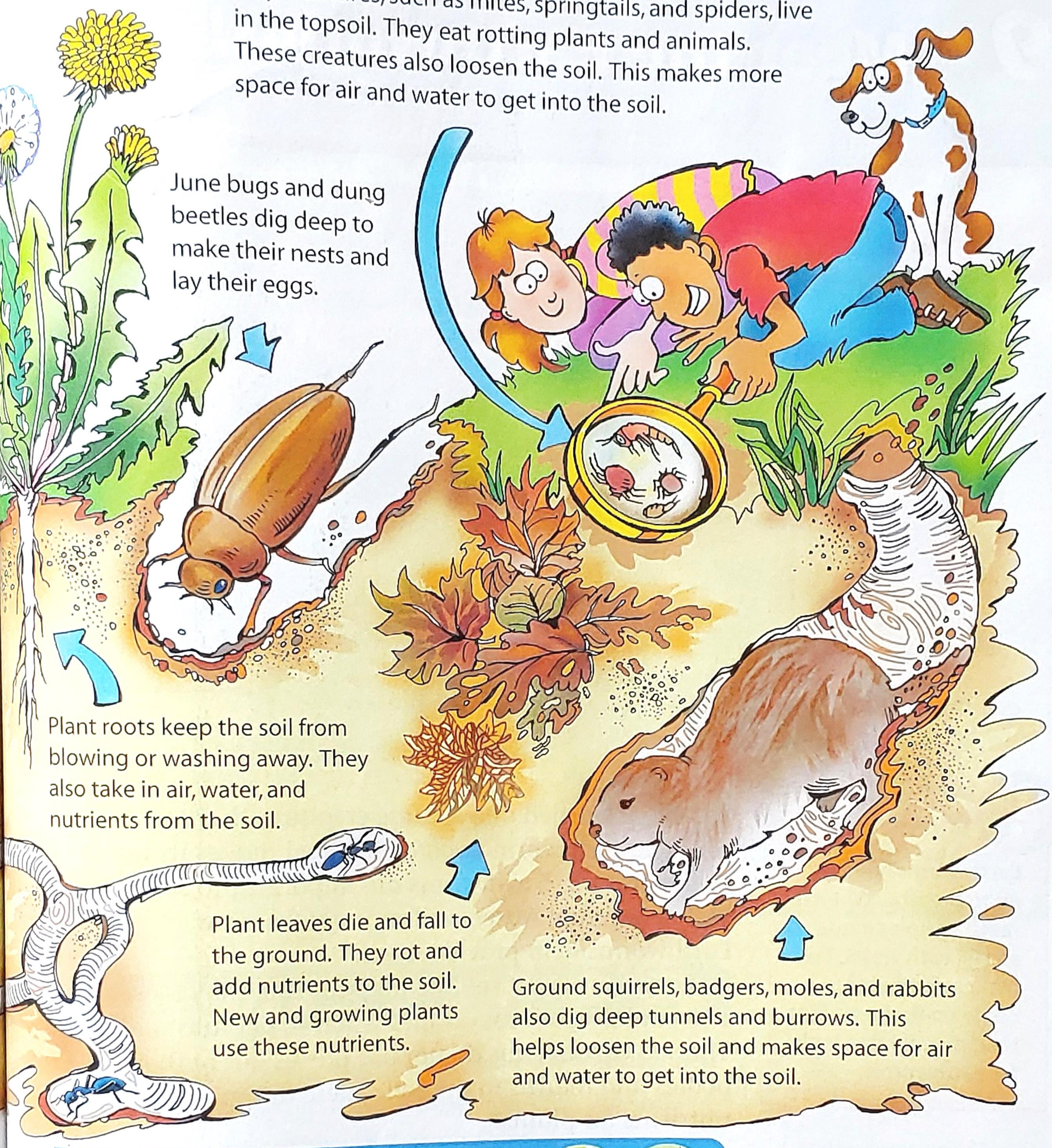

Tiny creatures, such as mites, springtails, and spiders, live in the topsoil. They eat rotting plants and animals. These creatures also loosen the soil. This makes more space for air and water to get into the soil.

June bugs and dung beetles dig deep to make their nests and lay their eggs.

Plant roots keep the soil from blowing or washing away. They also take in air, water, and nutrients from the soil.

Plant leaves die and fall to the ground. They rot and add nutrients to the soil. New and growing plants use these nutrients.

Ground squirrels, badgers, moles, and rabbits also dig deep tunnels and burrows. This helps loosen the soil and makes space for air and water to get into the soil.

Communicate

1. Create a way to show how plants, animals, and soil depend on each other. You might:
   - write and illustrate a story
   - create a comic strip
   - make a model and present it
   - create a computer slide presentation

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Lesson

9

Meet the Earthworms!

Goal To find out how earthworms help provide what plants need to grow

Get Started

Earthworms drag pieces of leaves and food into the soil. The leaves and food decay and make humus. Humus adds nutrients to the soil.

Earthworms need air to breathe. When it rains, air holes in the soil fill with water. This makes earthworms come up to the surface. Next time it rains, look for earthworms.

You have learned about some creatures that live in the soil. The earthworm [*mohtew* in Cree] makes its home in the ground. Earthworms are important to soil. Plants need air, water, and nutrients to grow. Earthworms help provide these.

Earthworms eat soil. As they eat soil, they loosen it. This makes space for air and water to get into the soil. The soil earthworms do not use passes out of their bodies and returns to the soil. These droppings provide nutrients for plants.

Work On It

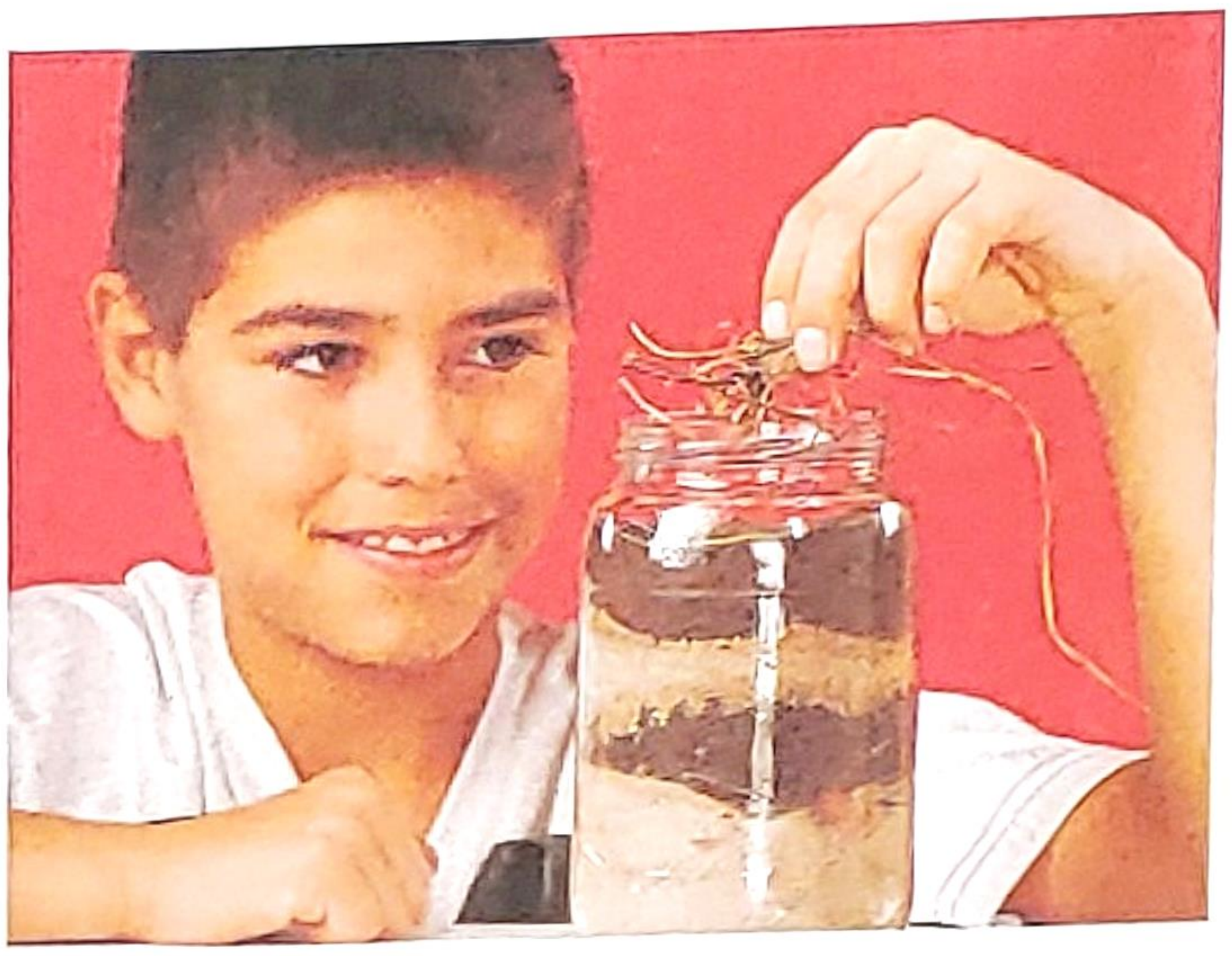
You know earthworms are important because they mix nutrients, water, and air into the soil. In this investigation, you will observe earthworms mix soil.

What You Need

- large, clear jar
- small rocks or pebbles
- sand
- soil
- spoon
- water
- earthworms
- worm food, such as leaves
- aluminum foil
- tape

What You Will Do

1. How will you get earthworms? Work with your class to come up with ideas.
2. Put some small rocks in the bottom of your jar.
3. Add sand and soil in layers, as in the photo.
4. Add enough water to make the soil damp, but not too wet.
5. Put the worms in the jar. Add some worm food.



6. Tape aluminum foil around the jar. Worms do not like the light.
7. Wait for a week. Take off the foil. How has the soil changed? Draw a picture of what you see.

Communicate

1. Show your picture and explain how the soil changed.
2. Describe how earthworms are good for the soil and how soil is good for earthworms.

Earthworms need air and a moist skin. Add a few drops of water to the soil every day.

Build On What You Know

Think about Lessons 8 and 9. Record what you will add to the soil that you make to keep it healthy. Explain how your choices will keep the soil healthy.

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Lesson

10

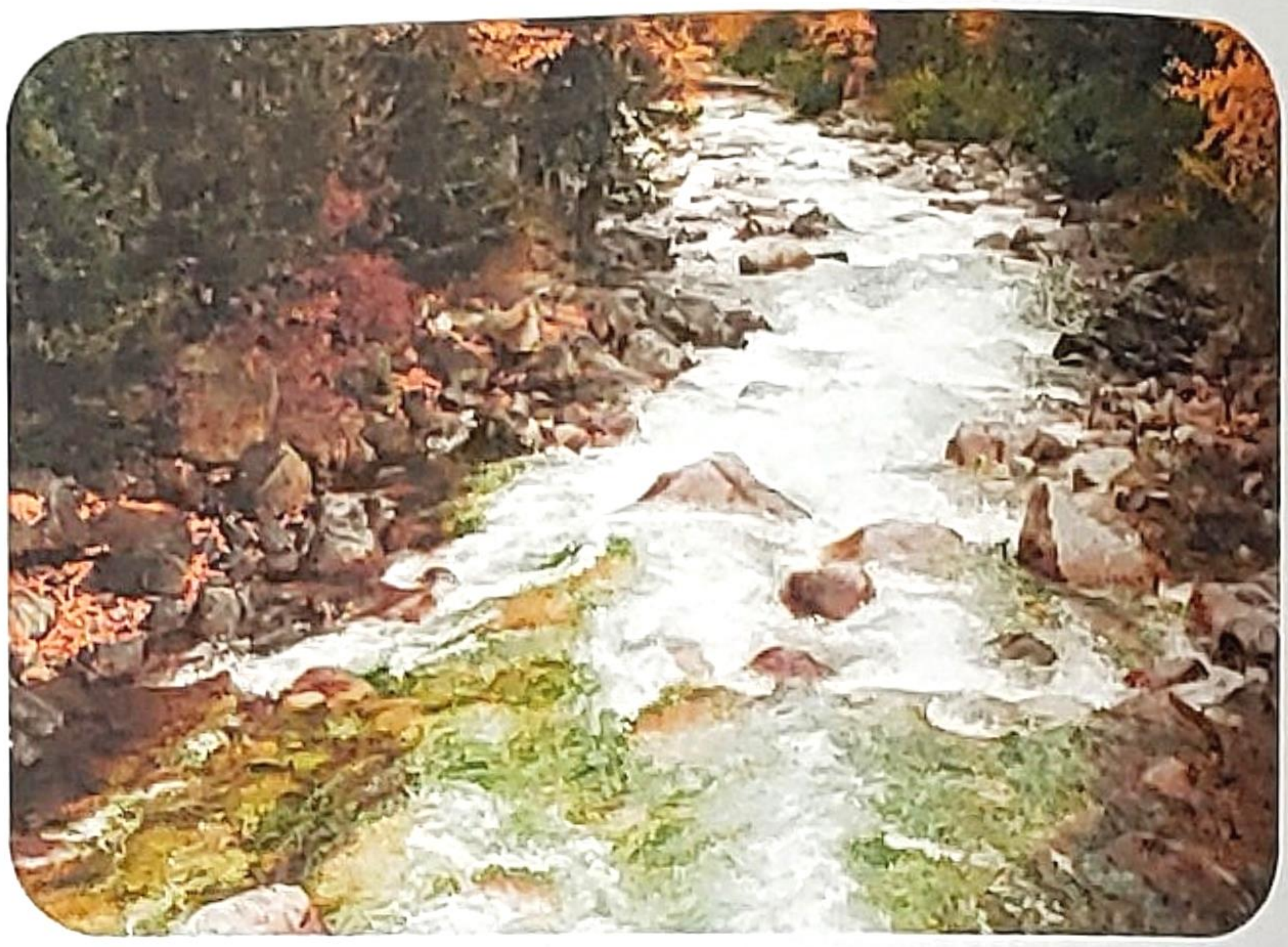
How Does Moving Water Affect Soil?

Goal To investigate what happens when water moves over different types of soil

Get Started

Water moves in different ways. Where can you see water moving where you live?

▲ Water falls as rain.



▲ Water flows in streams and rivers.

▲ Water flows out of sprinklers to water plants.

▲ Snow melts in the spring and runs off fields.

Work On It

You have learned that sand, silt, clay, and loam hold different amounts of water. What happens when water moves over different types of soil? Follow the steps on the next page to plan an investigation and find out.

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What You Need

- equal amounts of sandy soil, silty soil, soil high in clay, and loamy soil high in humus
- 4 cookie sheets or baking pans
- 8 blocks or books
- measuring cups
- water
- camera (optional)

What You Will Do

1. In which soil sample will water move the most soil particles? Record your prediction.
2. How will you use the materials shown to find out what happens when water runs over each soil sample? What other materials could you use?
3. Draw a diagram to show how you will set up your investigation.
4. Carry out your investigation. Record your results.
5. Answer the question: In which soil sample did water move the most soil particles? Be ready to explain your answer.

You might want to use diagrams, photos, or videos to record your results.

Communicate

1. In which soil sample did water move the most soil particles? Share and compare your results with your classmates.
2. Why do you think water moved more soil particles in this sample? Explain your answer.
3. Where did the moving water leave the particles?

Lesson 11

Erosion Changes Soil

Goal To find out how moving water causes soil erosion

Get Started

Over time, moving water can cause many changes to rock. It can help pebbles form in rivers. It rubs pebbles together. This makes them smooth. Moving water can also break down rock so that sand forms on beaches. Ocean waves beat on rocks and shells and slowly break them into tiny pieces. Scientists think that it takes millions of years to turn rocks and shells into sand.

Moving water in rivers carries soil and rocks to other places.

Ocean waves can carry sand to different places.

Work On It

Pebbles, sand, and soil take hundreds of years to form. But sometimes it does not take long for soil to be carried away.

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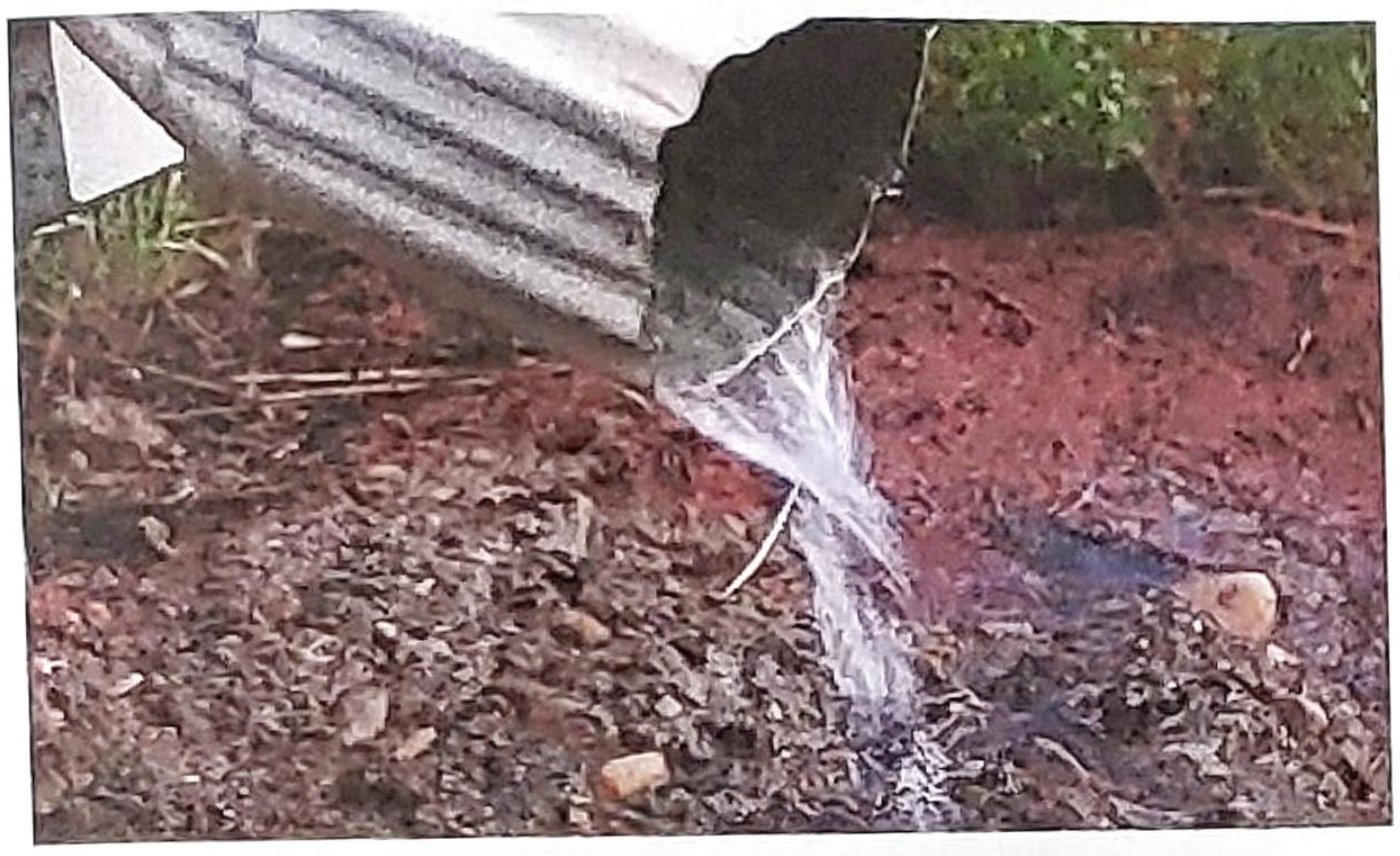
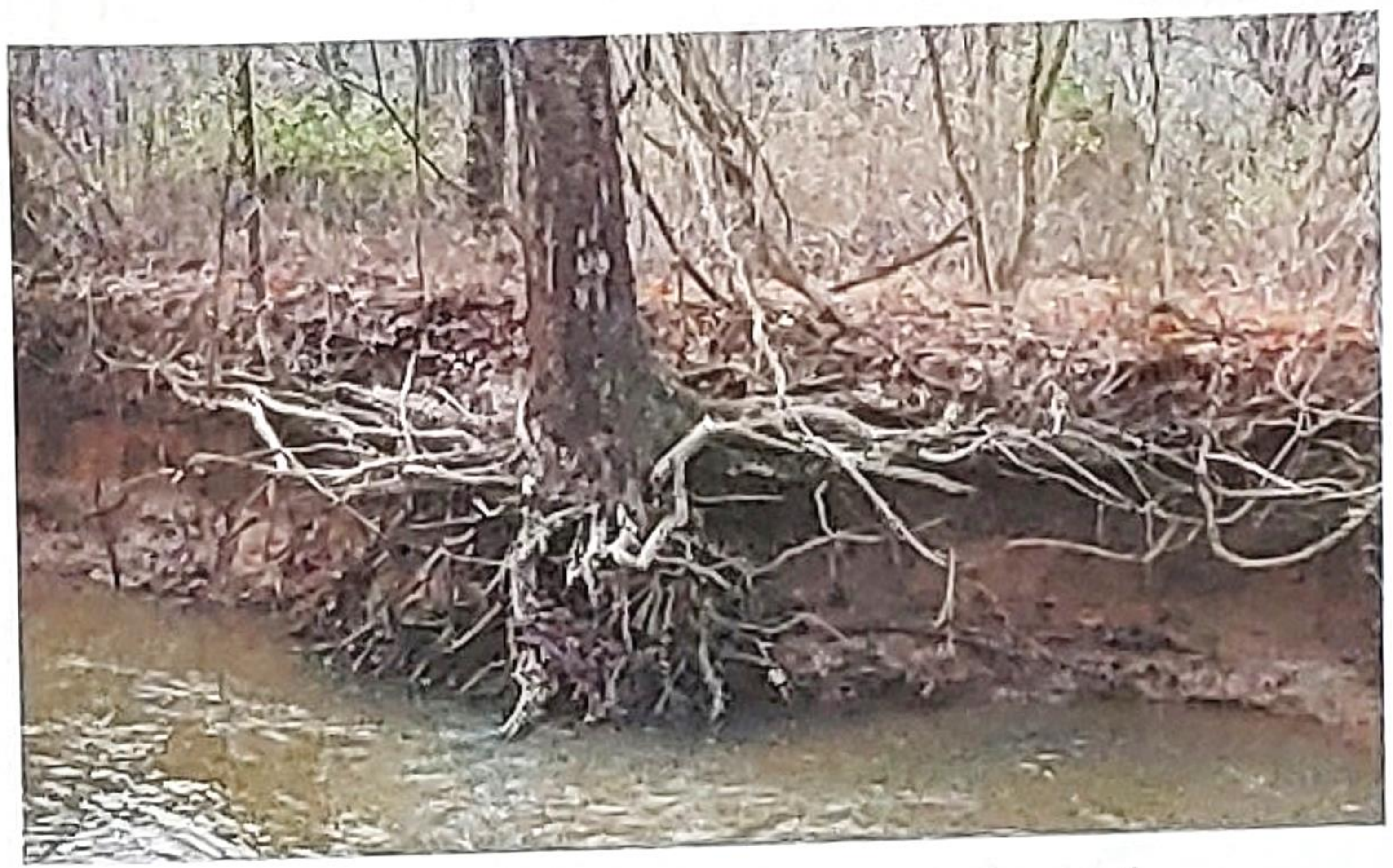
Soil erosion happens when soil moves. Moving water can cause erosion.

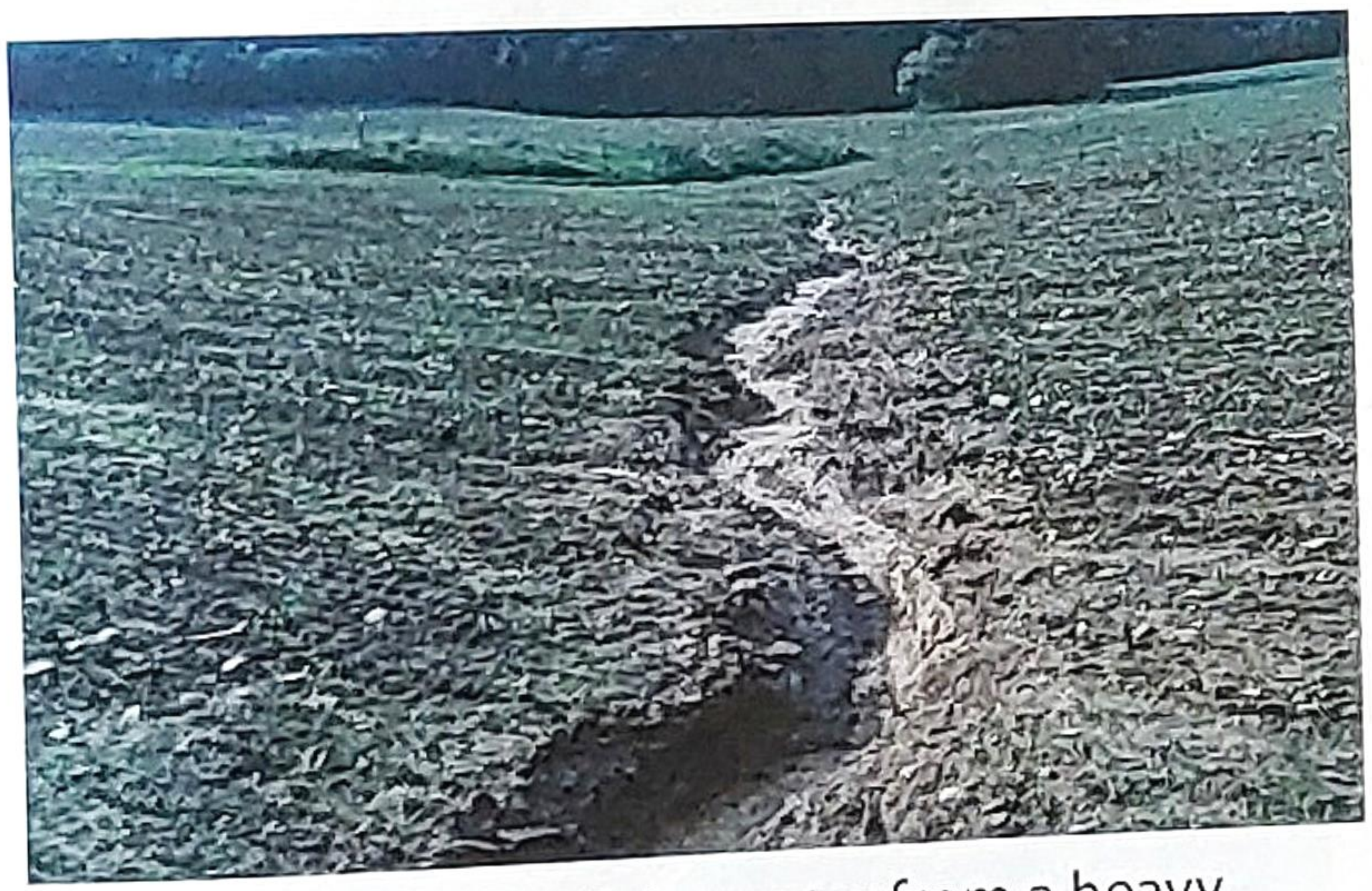
1. Look at the photos on this page. Discuss how moving water is causing erosion in each photo.
2. Discuss places where you have seen moving water cause erosion.



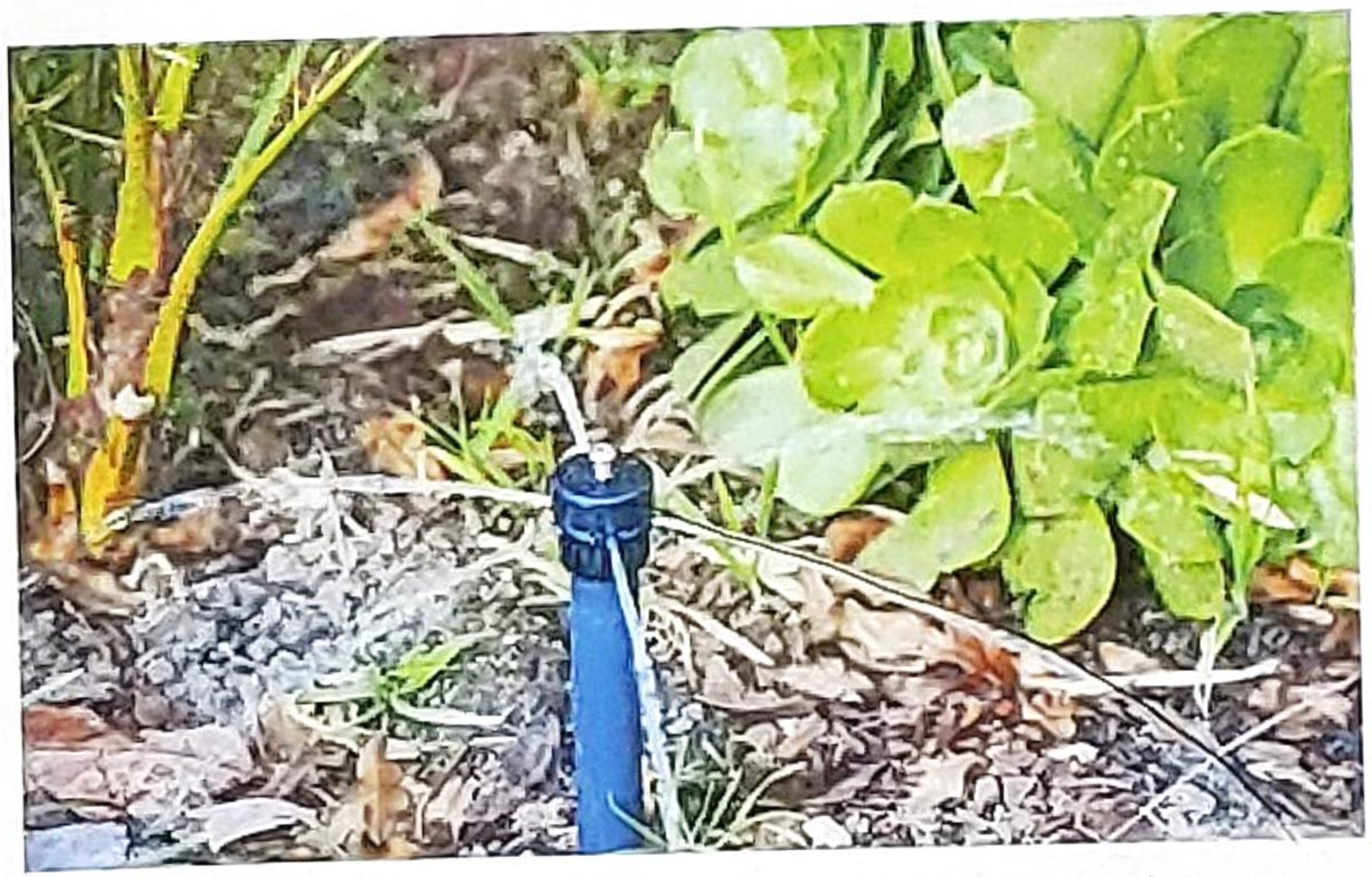
Heavy rain makes water pour out of the downspout. As water hits the ground, it picks up soil particles and moves them.



Moving water in a stream or river cuts soil away from the bank.



Soil cannot take in all the water from a heavy rain. Water pools on top of the soil, flows down slopes, and picks up soil particles as it moves. In this washout, the moving water cuts a channel in the soil.



Sprinklers add water for plants in gardens, lawns, and fields. When a stream of water hits the soil, it moves particles. When it keeps hitting the soil in the same place, it cuts a channel through the soil.

Communicate

1. How does moving water cause soil erosion?
2. Where would you expect to see more erosion from moving water: a sandy beach, the clay banks of a river, or a field for growing crops? Why?

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Lesson 12

How Can We Prevent Soil Erosion?

Goal To investigate how to prevent water from eroding soil

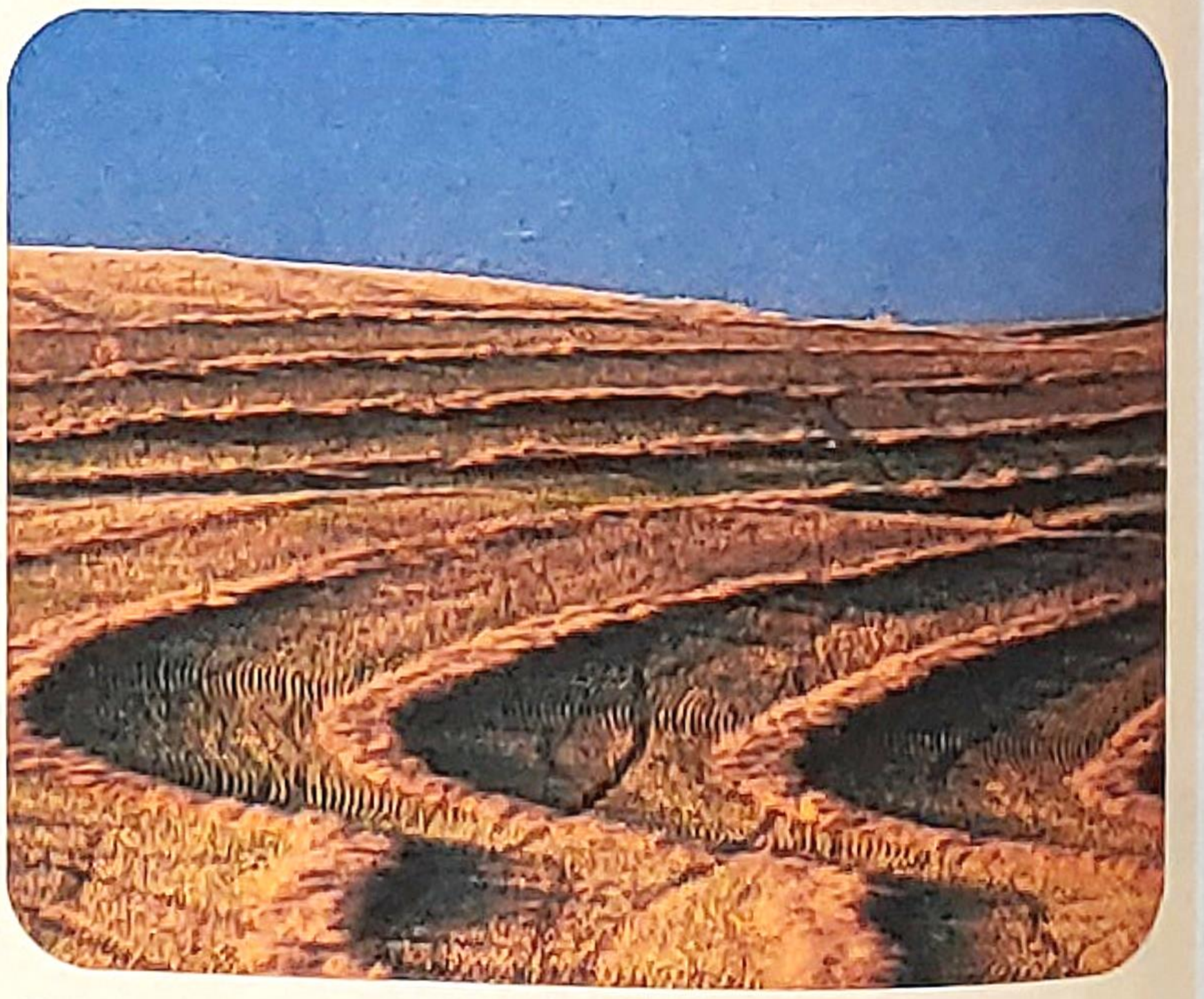
Get Started

Moving water picks up soil particles and moves them to different places. Sometimes a lot of soil is carried away. But people can prevent moving water from eroding soil. They can find ways to help soil stay in place and take in water.

A gardener adds humus to the soil. This adds nutrients and helps the soil take in more water.

A groundskeeper uses a machine to make holes in a sports field. These holes let water into the soil.

Planting trees and plants helps hold the soil in place. Their roots also provide a way for water to get into the soil instead of moving over it.



Some farmers plant crops around the curve of a hill instead of up and down. The curved crop rows help prevent erosion.

©P

Work On It

How can you prevent water from eroding soil? Use the steps below to plan an investigation and find out.

What You Will Do

1. How can you prevent water from eroding the soil? Record your idea.
2. Draw a diagram to show how you will set up your investigation. You will need to set up two equal amounts of loam exactly the same. Then, you will try your idea on one, but not the other.
3. What materials will you need? List them.
4. Carry out your investigation. Record your results with diagrams, photos, or video.
5. How can you prevent water from eroding the soil? Be ready to explain your answer.

What You Need

- loam
- 2 cookie sheets or baking pans
- water
- other materials you choose
- camera (optional)

Communicate

1. What did you find out in this investigation? Share and compare results with classmates.
2. How would you change your investigation if you did it again? Show your idea to a partner.
3. What other ideas could you try to prevent water from eroding the soil? Discuss your answer.

Build On What You Know

Plan how you will prevent moving water from eroding the soil in your vegetable garden.

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Lesson

13 Using Earth's Soils

Goal To learn how people use different soils

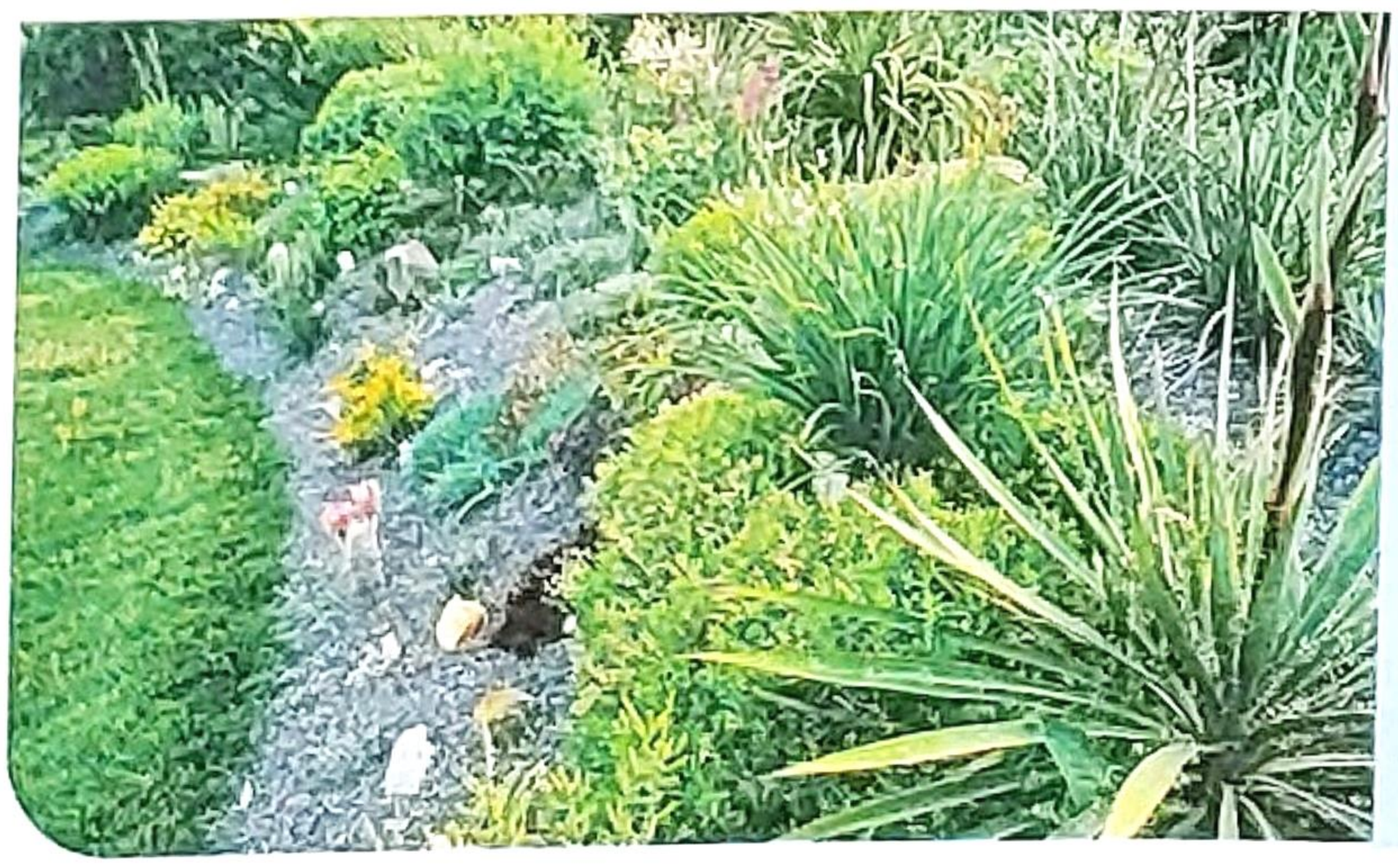
Get Started Different soils have different uses. What a soil is used for depends on its characteristics.

Farmers need soil that holds nutrients and water for plants. They use loam for growing crops. Loam has sand, silt, clay, and humus.

When wet clay particles are pressed together, they stick. Then they dry smooth and hard. Potters use clay to make pottery.

Construction workers pack layers of sand and gravel on soil to build roads. As the particles pack together, they make a solid base.

Wetlands store and purify water. When it rains, they soak up water like sponges. The soils in wetlands are high in clay, silt, and humus.



People build berms to prevent erosion, reduce noise, or landscape yards. **Berms** are mounds made of sand and gravel, and topped with clay and then loam.

©P

Work On It

People use Earth's materials to make useful things. Now it is your turn. You will use clay to make something useful.

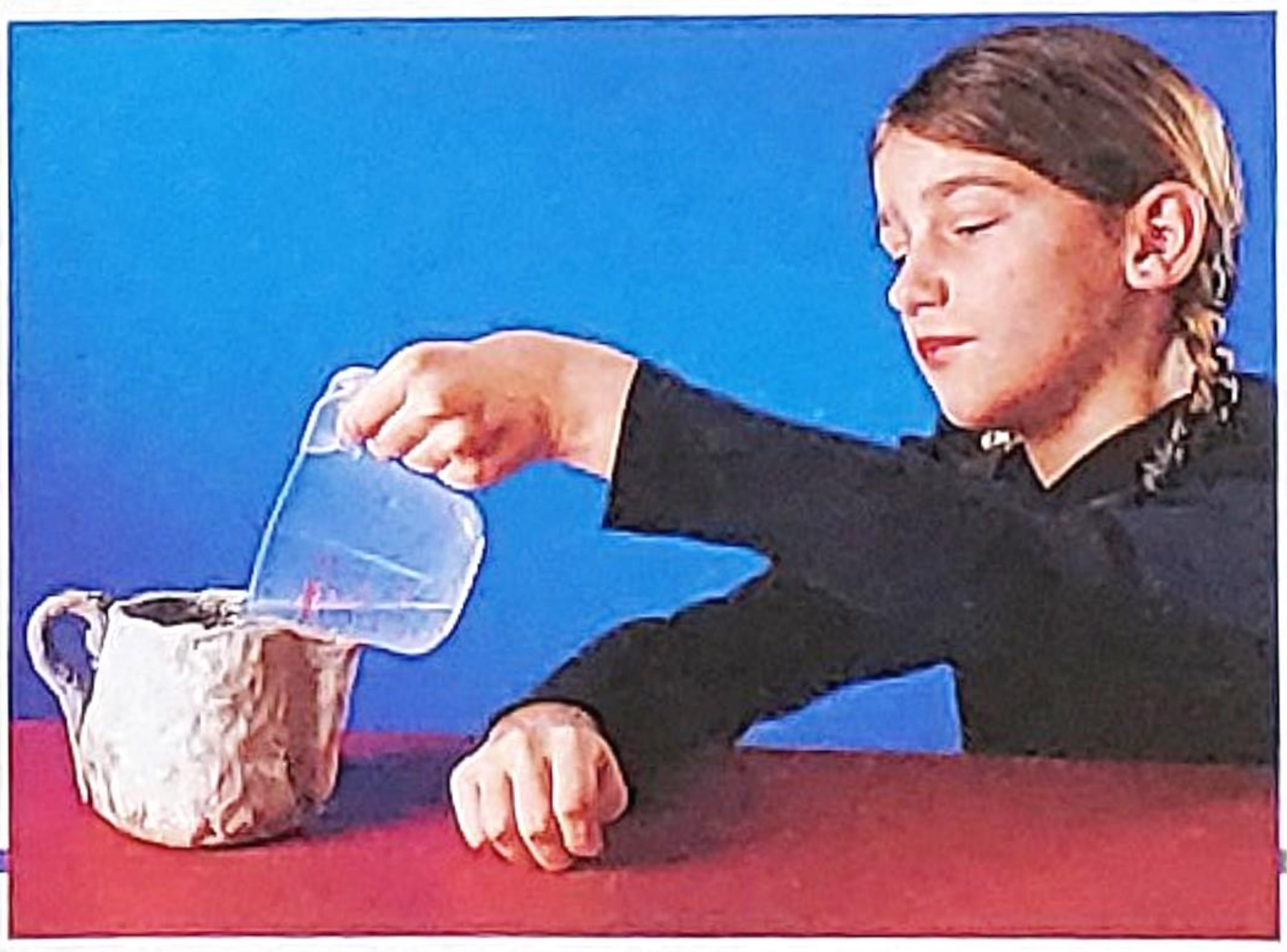
What You Need

- clay
- water
- plastic or wood board
- tools for shaping and cutting clay

What You Will Do

1. Think about what you will make. How will it be useful?

2. Draw a picture of what you would like your clay object to look like.
3. Make your object. Remember to keep the clay wet.
4. When you are finished, let the clay dry. You can paint it later. Your teacher might arrange to have your object fired in a kiln (a hot oven).
5. Check to see if what you made does what it is supposed to do.



Communicate

1. Show your finished object and explain how clay is good for making something useful.
2. What other useful things could you make out of clay?
3. What soil type would you use to make an earth shelter? Describe your reasons for using this type.

Lesson 14

Preventing Harm to Our Soil

Goal To find out how people can prevent harm to soil

Get Started

Healthy soil has spaces to hold air and water. When soil is **compacted**, the particles are pressed closer together. There is less space between the soil particles.

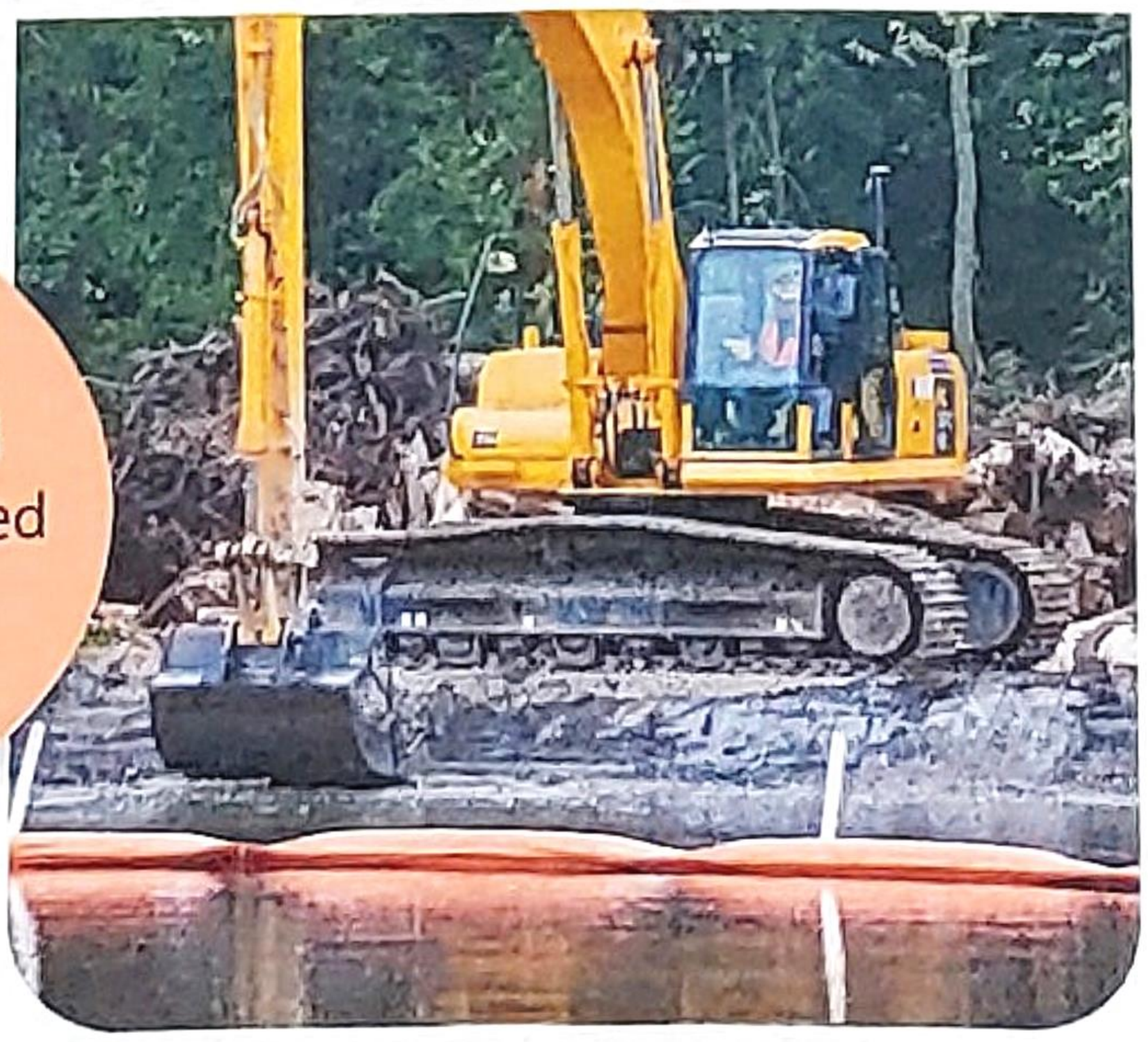
Compacted soil cannot take in all the water that plants need. When it rains, water cannot soak into the soil fast enough. It gathers on top of the soil and starts to move. This runoff erodes the soil. Compacted soil also means less space for roots to grow. Roots that cannot spread cannot get the water, air, and nutrients that plants need to grow.

Healthy plants need healthy soil. Polluted soil is sick soil. It is spoiled with waste from humans. It cannot grow healthy plants. How does soil become polluted? Some farmers use poisonous chemicals to control insects and weeds. These chemicals can build up in the soil and make it sick.

Oil or gas leaks or spills also pollute soil. Wastes from landfills can spread into soil. Some industries bury their waste in soil. How might this harm be prevented?

Farmers use heavy equipment in their fields. This equipment packs down the soil.

If the soil is wet, it may become more compacted. How can farmers reduce this?



Gas leaked from an underground tank. The polluted soil has to be removed.

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Work On It

You will see what happens when it rains on compacted soil. Then you will investigate how to make the soil healthier for plants.

What You Need

- loam
- 2 cookie sheets or baking pans
- 6 books
- watering can
- water

What You Will Do

1. Put equal amounts of loam in each pan.
2. Pack the loam in one pan until it is firm.
3. Place one end of each pan on two to three books to make a slope.
4. Sprinkle equal amounts of water on each pan.
5. Record what happens in each pan.
6. What can you do to the compacted soil to help it take in more water? Record your idea. Try it.
7. After you changed the compacted soil, what happened when you sprinkled water on it?

The Canadian Dictionary for Children

Communicate

1. What did you find out in this investigation? Show and share your results with classmates.
2. What other ideas could you try to help compacted soil take in more water?
3. If the soil can take in more water, how will this help plants? Discuss your answer.

©P

Ask...

Why is it important to understand soil?

A Forester

My name is Bill Murray. I work for a forestry company in Saskatchewan. I plan when and where we will harvest trees. To do that, I have to use everything I know about soil.

We start harvesting trees in the spring. Frost comes out of sandy soil sooner than loam or clay soil, so we look at sandy sites first.

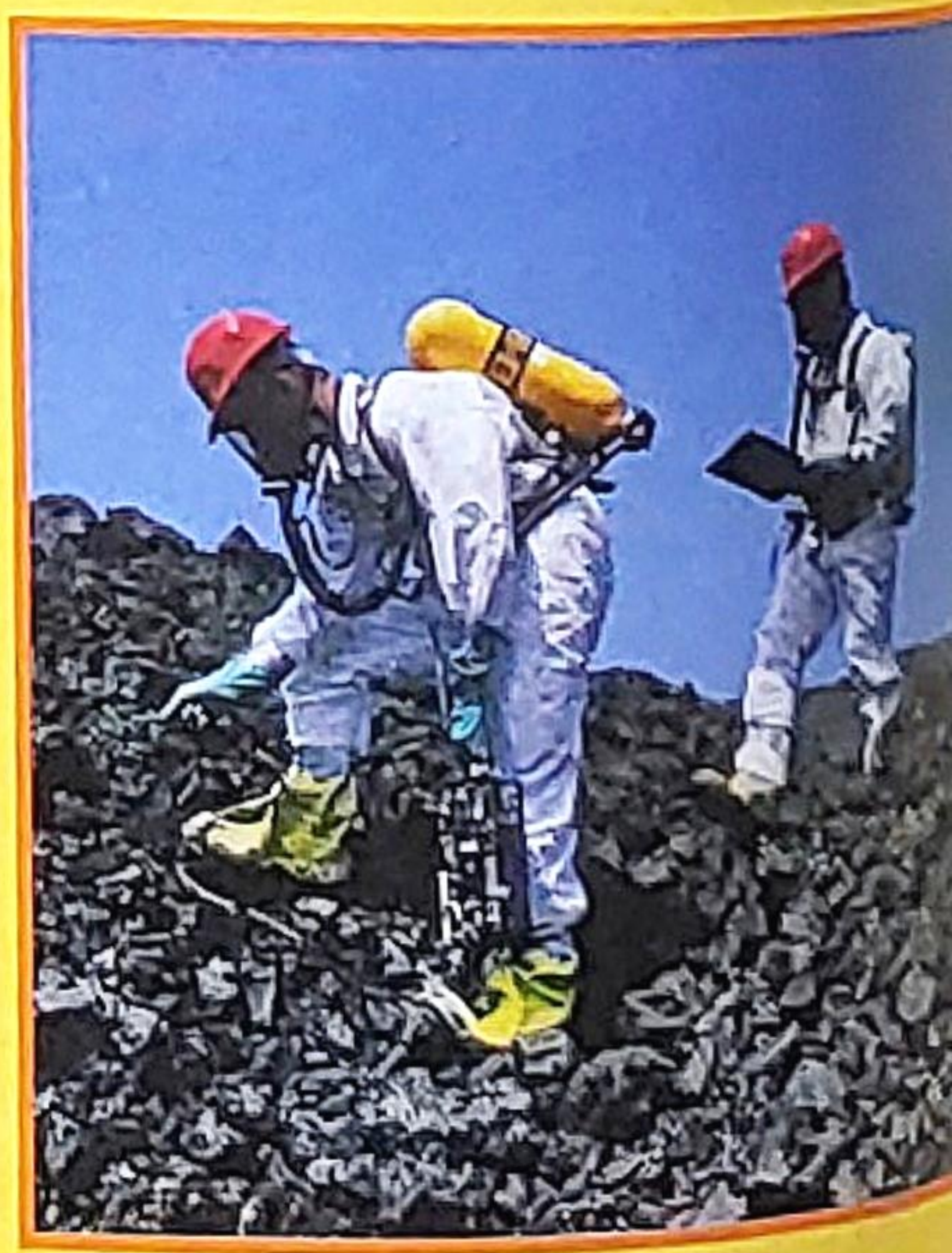
We cannot leave deep ruts when we harvest trees. Ruts compact the soil. If the tires on a skidder (see photo above) make a rut, the driver leaves the area. We can log on sandy sites, sooner than on loam or clay sites, because we do not leave ruts.

An Applied Science Technologist

My name is Stephanie Langevin. I am an applied science technologist with the City of Saskatoon. I check to make sure that soil is healthy. If I find that it is polluted, then I work to make it healthy again.

When the city buys or sells land, I work with other city departments to check the soil. I look at the history of the land. In the past, could a business or activity have polluted the soil with chemicals? If so, I get people to test the soil.

If chemicals are found, I review an action plan to clean up the soil. Then I send the plan to the Ministry of the Environment for approval to begin cleaning up the soil.



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A Traditional Herb Gatherer

Hello, my name is Yvonne Morin. I am a traditional herb gatherer from the Sandy Bay First Nation. I learned about plants and the soil from my grandparents and parents.

I pick many different plants to use in my traditional medicines. But often when I go into an area to pick the plants, I cannot use them because of the pollution.

In the North where I find most of the plants that I use, there are lots of pop cans and potato chip bags that have been thrown away by hikers and campers. I have to walk for hours and hours in order to find earth and plants that are untouched by pollution. Polluted soil does not have the same nutrients as unpolluted soil. This hurts us because we depend on Mother Earth.

I am saddened when I see the lack of respect we have for the soil. It is very important that we show respect for Earth and its soil. Otherwise, we will not have the plants necessary to make important medicines.

Research

Research other jobs related to soil, such as a farmer, gardener, landscaper, potter, geologist, engineer, builder, construction worker, or conservation officer. Find out what they need to understand about soil to do their work.

Lesson

15 Taking Care of Our Soil

Goal To find out how to keep soil healthy

Get Started

"Hey Mia, what are you doing?" asked Jay.

"I'm putting vegetable peelings in the composter," said Mia.

In go vegetable peelings and grass clippings ...

Some farmers spread rotted manure on their fields to add nutrients to the soil. Some gardeners add peat moss to the soil to help plants grow better. Peat moss takes in air, water, and nutrients.

"What's a **composter**?"

"It's a container where we put our peelings and grass clippings to make compost," said Mia. "**Compost** is soil with humus that helps plants grow. Dad is showing me how to make compost for our garden. The plants we grow use nutrients from the soil, and compost has lots of nutrients. So, Dad says that when we add compost to the soil, we are giving nutrients back to the soil."

"Cool!" Jay looked in the composter. "But how does it make all this stuff into compost?"

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Mia grabbed a shovel and added dirt to the top of the peelings. "The peelings and the grass have to rot to make compost. So, we add water to make everything damp and then add a layer of soil on top like this."

"And then you leave it to rot?" asked Jay.

"Kind of," said Mia. "We keep adding layers of plant waste and soil. Then every week, we stir the layers with a stick. In about two months, we have compost to add to the garden."

"Just like that?"

"You bet."

"I'm going to ask my mom and dad if we can start a composter!"

… add water, soil, and stir. Two months later, out comes compost for our garden soil.

Work On It

What other ways can people help the soil? How do people in your community take care of soil? You will create a survey to find out.

What You Will Do

1. Record questions you want to ask, as shown.
2. With your group, decide:
   - how you will record people's answers to your questions
   - how many people you will survey
   - how you will share the results of your survey

- Do you compost plant waste and add it to soil?
- Do you spread manure on soil?
- Do you add peat moss to soil?
- What other ways do you care for soil?

Communicate

1. How do people take care of soil in your community? Share the results of your survey.
2. How can you take care of the soil in your community? Discuss and create an action plan.

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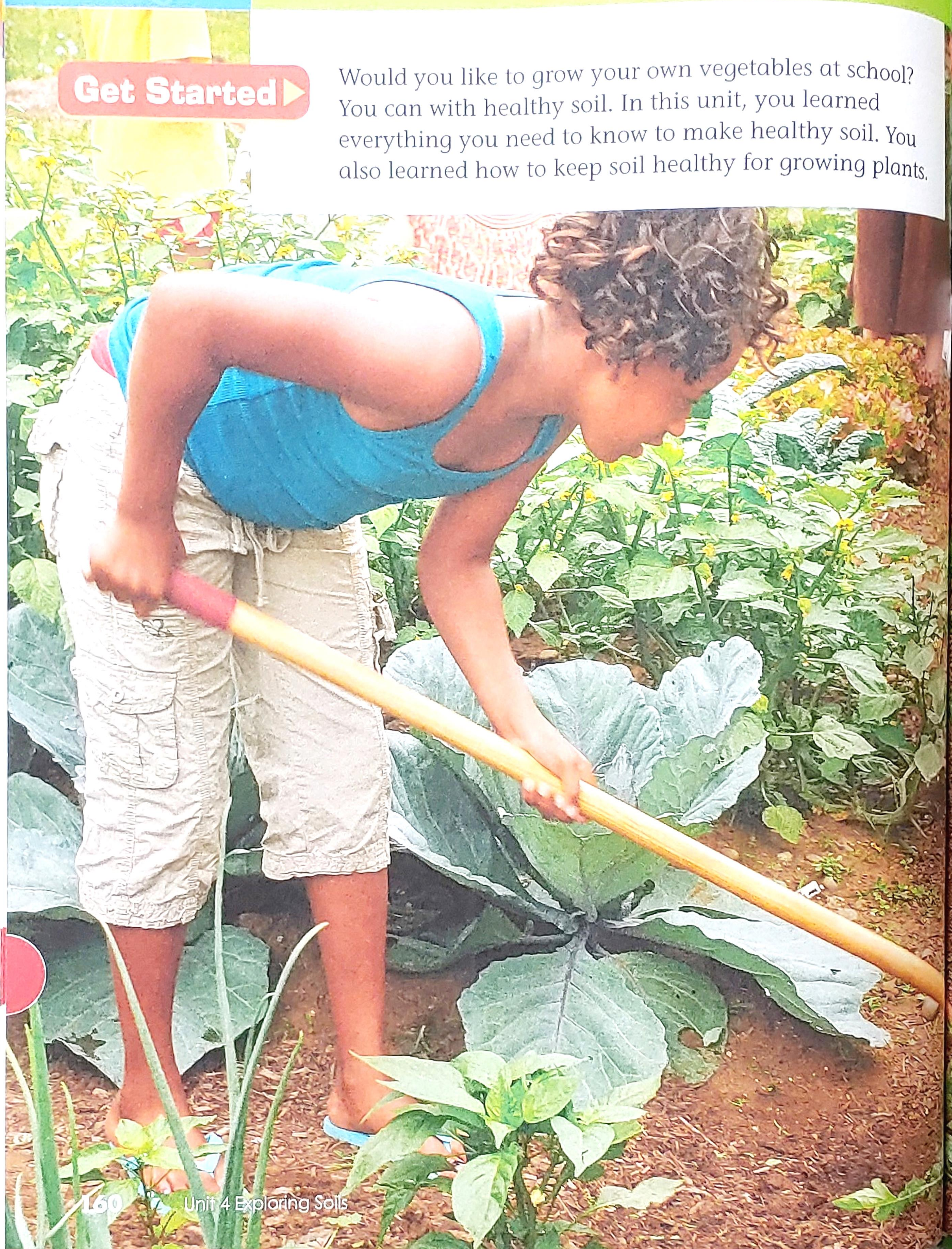
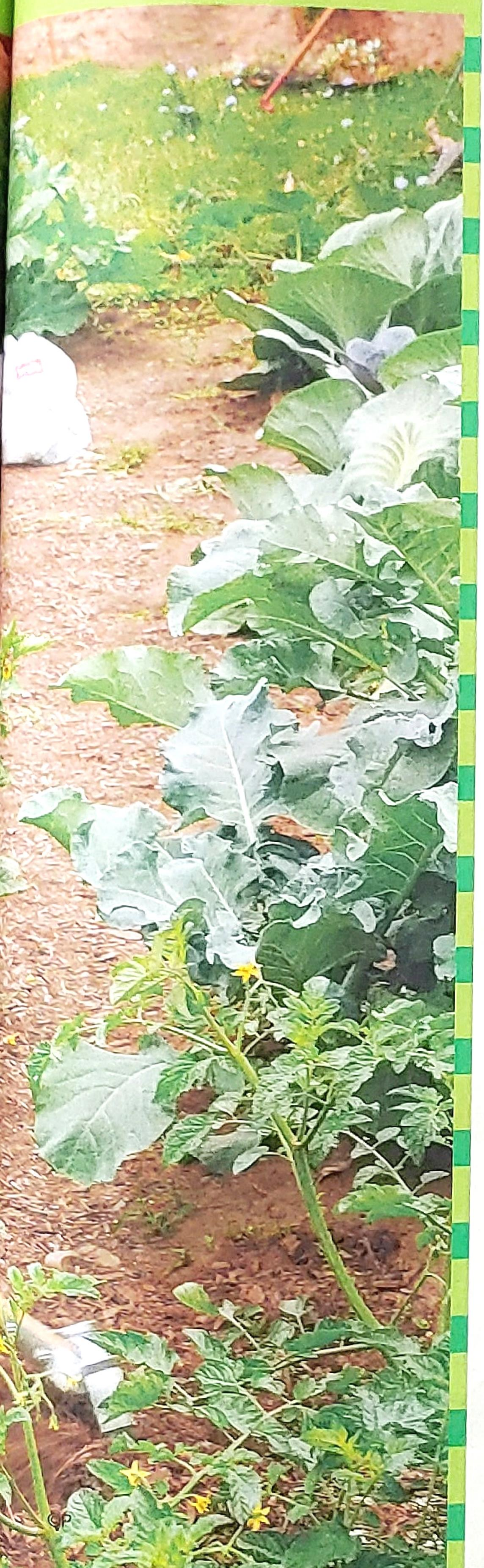
Design Project

Create Soil for a Garden

Get Started

Would you like to grow your own vegetables at school? You can with healthy soil. In this unit, you learned everything you need to know to make healthy soil. You also learned how to keep soil healthy for growing plants.





Work On It

You will work with your group to design an action plan to create healthy soil for a class vegetable garden. Then you will use a soil sample from your schoolyard to put your plan into action. Recording your ideas on a design sheet will help you plan.

You will meet with your group to brainstorm ideas for creating healthy soil. You will discuss which ideas you want to use. Then you will make a list of materials and the steps you need to carry them out.

Communicate

1. Show the class your action plan and evidence that it was a success.
2. Show the soil you made. Explain how you made it from the sample you were given.

Assessment Checklist

Check to make sure that you:

☑ described how you will make healthy soil in your action plan

☑ used a soil sample from the schoolyard to create healthy soil

☑ decided on a way to show that your soil is healthy

UNIT 4 Summary

In this unit, you learned the following ideas:

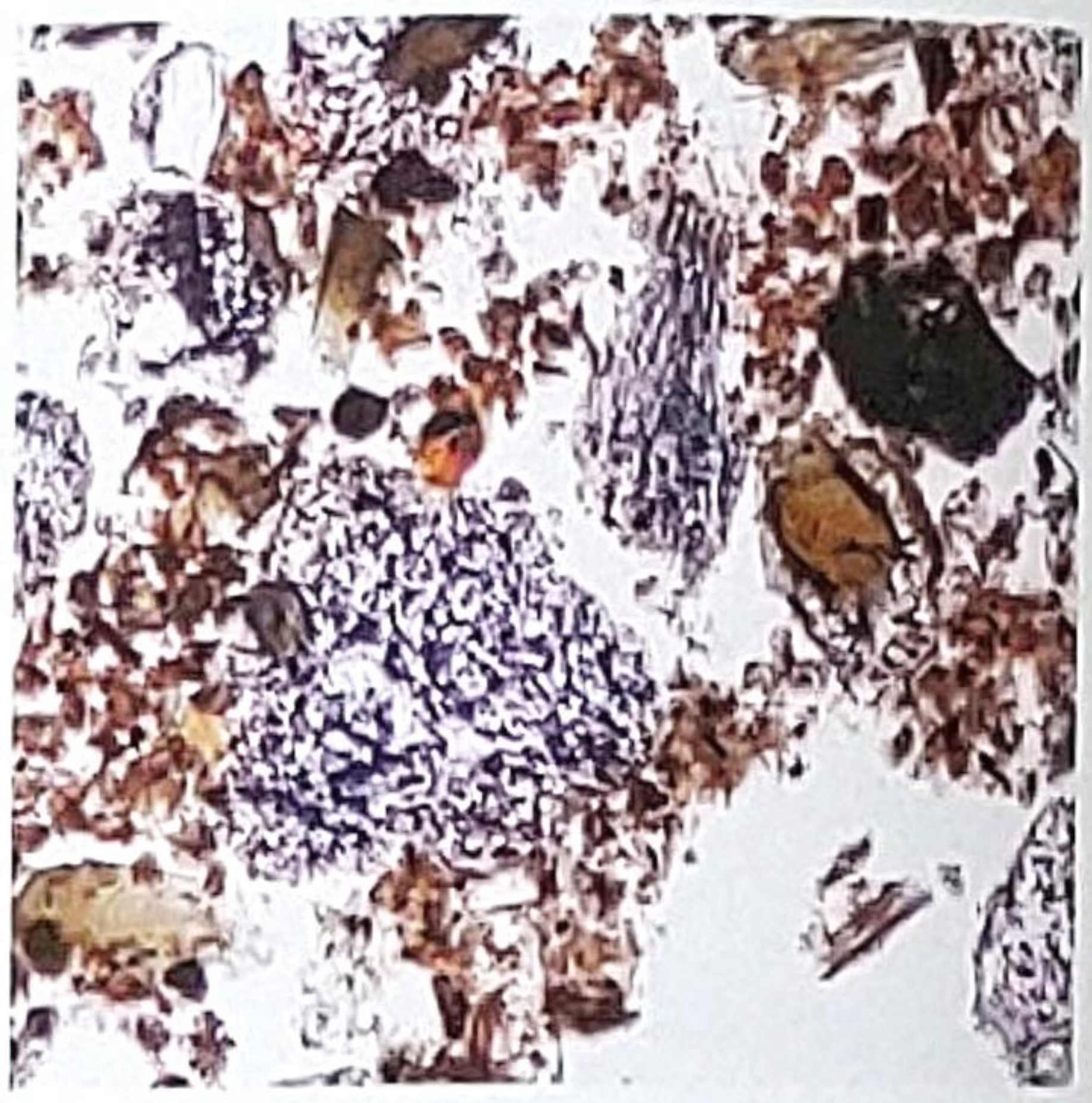
Scientists and First Nations and Métis peoples understand soil in similar and different ways.

Summary

- Scientists say that soil has four non-living parts: rocks, air, water, and humus.
- First Nations and Métis peoples say that Mother Earth is made up of four parts—rock, air, water, and fire.

Vocabulary

- particles, p. 130
- humus, p. 130



Air and water fill the spaces among the rock particles and humus in soil.

Soils are different.

Summary

- Different types of soil have different amounts of sand, silt, and clay.

Vocabulary

- sand, p. 136
- silt, p. 136
- clay, p. 136
- loams, p. 136

Loam is a mixture of humus, sand, silt, and clay.

Plants, animals, and soil depend on each other.

Summary

- Plants grow in soil. Plant roots take in nutrients, water, and air from soil and keep soil in place.

Vocabulary

- soil erosion, p. 149

Planting trees prevents erosion as tree roots hold soil in place.

©P

Plants, animals, and soil depend on each other. (continued)

Summary

- Animals that live in soil loosen it. This makes more space for air and water. Their waste adds nutrients to the soil that plants need.

Soil is home to many plants and animals, such as earthworms.

People use soil in different ways.

Summary

- People use different types of soil for different tasks.

Vocabulary

- berms, p. 152

We use sand and gravel to make roads and berms.

People can affect soil.

Summary

- People can pollute soil with chemicals and compact soil with heavy equipment.
- People can add nutrients to soil by adding humus, compost, or rotted manure.

Vocabulary

- compacted, p. 154
- composter, p. 158
- compost, p. 158

When soil is compacted, the particles are pressed closer together. This increases if the soil is wet.

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